In situ field experiments to determine the soil physical characteristics of soils under conventional and no-tillage management systems

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Abstract

Two instantaneous profile experiments were conducted to determine the soil hydraulic properties of a clay-loam soil. The experiments were conducted in a conventional tillage field and in a 3-years no-tillage field. In each experimental plot 7 sets of soil water content and soil water tension were collected. After the measurements were, analyzed the Van Genuchten water retention and unsaturated hydraulic conductivity curves were fitted to the field data. It was found that the vertical and horizontal spatial variability in the no-tillage plot was larger than in the conventional tillage plot. The results of the study can be used in a computer model to quantify the variability of percolation within each plot and to determine the potential threat of deep percolation of contaminants.

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1. Introduction

The study presented in this report was conducted as part of a research project into chemical transport and persistence in a furrow-irrigated, no-tillage management system. The research was a joint project between New Mexico State University (NMSU) Department of Agronomy and Horticulture, and NMSU Department of Entomology, Plant Pathology and Weed Science, both at Las Cruces, NMSU Agricultural Research Center (ARC) near Clovis, where the field experiments were conducted, and New Mexico Institute of Mining and Technology (NMIMT) Department of Geoscience at Socorro.

No-tillage and minimum-tillage management systems are being introduced in the production of crops throughout the United States as a soil conservation technique. For weed control these management schemes rely primarily on the use of herbicides as a replacement for tillage. The extensive use of chemicals in no-tillage or minimum-tillage presents the potential threat of deep percolation of contaminated water to the groundwater. This threat to the quality of groundwater resources calls for further research and the effects of soil tillage on water and solute transport in the unsaturated zone of the soil profile must therefore be identified in order to supply environmentally safe tillage and weed control guidelines. At the experimental site, where the groundwater table is at a depth of 90 meters below the surface, the chances of groundwater contamination are minimal, whereas the soil and irrigation techniques used are similar to the ones encountered in areas with shallow groundwater tables. As part of the joint research project, the study presented here has had the aim of characterising the soil hydraulic properties of the soil profile at the field site. The findings of the study have implications for future modeling of water and solute transport in the unsaturated zone of areas with a shallow groundwater table.

The determination of soil hydraulic properties, the soil water retention and hydraulic conductivity curves, are essential to obtain accurate of numerical simulations of water flow and transport of solvents. One of the problems encountered is that the hydraulic properties measured under field and laboratory conditions may differ significantly. For example, Flühler et al. (1977) found that the hydraulic conductivities of fine-textured, swelling soils measured under field and laboratory conditions may differ by more than one order of magnitude. Wierenga et al. (1991) (in Wierenga et al. 1993) also found, in an extensive testing program at the Las Cruces trench site, that laboratory-derived and field-measured saturated hydraulic conductivities showed considerable differences. The soil water retention curve is more easily measurable but similar difficulties arise here. That is, in situ-determined water retention curves often disagree with curves determined on undisturbed core samples (Luxmoore et al. 1981; Dane 1980). Because of the discrepancy between laboratory and field data, in situ measurements were preferred to obtain reliable data for the simulation of water and solute flow under field conditions.

Several methods of determining in-situ unsaturated hydraulic conductivity, such as the tension infiltrometer method, the instantaneous profile method (IPM), and the double-ring infiltrometer test are available. The IPM, also known as the internal drainage or unsteady drainage method, was the method chosen for this study. The IPM is perhaps the most reliable

method for determining unsaturated hydraulic conductivity and water retention data but has the major disadvantage that the method is rather time-consuming and expensive. The IPM was developed from the drainage flux method (Watson 1966) and has been used by many researchers to determine the hydraulic properties of a complete soil profile in situ. The original drainage flux method has been made applicable to field situations where a water table is absent or too deep to affect soil water flow and where the soil profile can be layered. The IPM measures the water retention curve over time and from these measurements unsaturated hydraulic conductivities can be calculated.

Analysing the field data results in a limited number of points on the water retention and hydraulic conductivity curves. For the modeling of water flow and solvent transport these curves have to be described by analytical functions or be presented in tables. Important advantages of the use of analytical functions is that they permit a more efficient comparison of the hydraulic properties of different soils and soil horizons, they are more easily used in scaling procedures, and they can be interpreted in terms of physically-based processes and parameters (Van Genuchten and Leij 1991). Analytical functions are therefore preferred in flow and transport studies to the use of tables. Van Genuchten (1980) presented a closed form relationship for the water retention and unsaturated hydraulic conductivity curve. The smooth function proposed by Van Genuchten for the water retention curve can relatively easily be incorporated into predictive models for the hydraulic conductivity (e.g. Mualem's and Burdine's predictive pore-size distribution models). The advantage of the use of the closed form of Van Genuchten is that the water retention and unsaturated hydraulic conductivity curves can be described with a limited number of 6 or 7 parameters, the so-called Van Genuchten parameters. These parameter sets can then be used in computer models to simulate water and solute movement in the unsaturated zone for different scenarios.

The main objective of this study has been the determination of sets of Van Genuchten parameters describing the physical characteristics of the soil profile at the experimental site, an Olton clay-loam, under conventional and no-tillage systems. Secondly, the variability between measurements within each experimental plot are examined in order to identify the number of replicas needed for these kinds of experiments. The third objective has been to gain a general impression of the magnitude of differences in soil physical characteristics between conventional and no-tillage cropping systems. A more conclusive and quantitative conclusion concerning the environmental threat of deep percolation of contaminants may be obtained through use of the results of this study in a computer model.

In Chapter 2 a short overview of the theoretical basis behind the experiments will be given. The characteristics of the experimental site and a detailed description of the field work and the way measurements were taken is presented in Chapter 3. In Chapter 4 the data analysis and the results are described and the final conclusions and recommendations are given in Chapter 5.

2. Theoretical basis

One-dimensional vertical flow in a soil profile is generally described by the Richard's equation (Richards, 1931)

$$\frac{\partial\theta(z,t)}{\partial t} = \frac{\partial}{\partial z}\left(K(\theta)\frac{\partial H(z,t)}{\partial z}\right) \quad (1)$$

where $\theta(z,t)$ is volumetric water content [L^3/L^3], t is time [T], z the vertical depth coordinate here taken as positive in downward direction [L], $K(\theta)$ the hydraulic conductivity [L/T], and $H(z,t)$ the hydraulic head [L].

With respect to the reference level, the hydraulic head at any point in the soil is given by

$$H(z,t) = h(z,t) - z \quad (2)$$

where $h(z,t)$ is the soil water pressure head [L] and z is the depth below the reference level.

Integrating equation 1 with respect to z between the limits $z = 0$ and a desired depth $z = z^*$ gives

$$\int_0^{z^*}\frac{\partial\theta(z,t)}{\partial t}dz = K(\theta)\left(\frac{\partial H(z,t)}{\partial z}\right)_{z^*}$$

$$or \quad (3)$$

$$\frac{\partial}{\partial t}\int_0^{z^*}\theta(z,t)\partial z = K(\theta)\left(\frac{\partial H(z,t)}{\partial z}\right)_{z^*}$$

where z^* is the soil depth to which the measurement applies.

The IPM measures θ and h at frequent time intervals in a soil profile that is deeply wetted and allowed to drain, while evaporation is prevented and no plant root extraction takes place. Because the soil surface is covered and only internal drainage is allowed, the left-hand side of equation 3 accounts for the total water content change per unit time to a depth z^* and the equation can therefore be written as

$$q = K(\theta)\left(\frac{\partial H(z,t)}{\partial z}\right)_{z^*} \quad (4)$$

where q is the total water content change per unit time to depth z^* [L/T].

Using equation 4 and a step-wise analysis of the data, the hydraulic conductivity for an average volumetric water content at a certain depth in the profile can be determined from the θ (t) and h(t) measurements. The procedure for the analysis of the data has been described by several researchers, e.g. Hillel et al. (1972) and Green et al. (1986); it is a straightforward

but lengthy process.

After calculating the K(θ) values, the soil hydraulic functions, i.e. the soil water retention and hydraulic conductivity functions, have to be described. These functions are essential for mathematical modeling of flow and transport in the vadose zone and many different functions have been developed in the past.

Soil water retention

A frequently used function to describe the soil water retention curve has been the Brooks and Corey (Brooks and Corey, 1964) equation,

$$\theta = \theta_r + (\theta_s - \theta_r)(\alpha h)^{-\lambda} \tag{5}$$

where the subscripts r and s are residual and saturated water content, α is an empirical parameter (L^{-1}), whose inverse is often referred to as the air entry value, n and m are dimensionless empirical shape factors, and λ is a pore size distribution index.

The Brooks and Corey equation has been shown to perform best for coarse-textured soils and/or repacked, sieved soils with relatively narrow pore size distributions (Van Genuchten et al. 1991). For many fine-textured and undisturbed field soils the results are less accurate because of the absence of a well-defined air-entry value for these soils.

A related and currently widely used soil water retention function is the equation of Van Genuchten (1980)

$$\theta = \theta_r + \frac{\theta_s - \theta_r}{\left[1 + (\alpha h)^n\right]^m} \tag{6}$$

or

$$S_e = \frac{1}{\left[1 + (\alpha h)^n\right]^m} \qquad where \quad S_e = \frac{\theta - \theta_r}{\theta_s - \theta_r} \tag{7}$$

where α, n and m are shape parameters and S_e is the effective degree of saturation or reduced water content.

The Van Genuchten function for the soil water retention curve has several advantages:

- the function can be incorporated with relative ease into predictive pore size distribution models for the hydraulic conductivity,
- the function possesses a simple inverse relationship,
- the function gives an excellent fit to observed retention data for most soils.

In this study we will use the Van Genuchten equation to describe the soil water retention function.

Observed field data sets, such as those collected in our experiment, have only a limited range of retention values in the wet range available. As described by Van Genuchten et al. (1991)

keeping the shape parameters m and n in equation 6 variable during the estimation process often leads to uniqueness problems. Implementing restrictions on m and n will generally lead to more stable results and has the advantage that the form of the predictive equation for the unsaturated hydraulic conductivity becomes less complicated.

Hydraulic conductivity

Several theoretical pore-size distribution models to predict the unsaturated hydraulic conductivity have been developed over the past few years. The model of Mualem has been used extensively and will be used in this study. A good review of previously published pore-size distribution models was given by Mualem (1986). The model for predicting the relative hydraulic conductivity presented by Mualem (1976) can be written in the form

$$K(S_e) = K_s S_e^l \left[\frac{f(S_e)}{f(1)}\right]^2 \tag{8}$$

where

$$S_e = \int_0^{S_e} \frac{1}{h(x)}\, dx \tag{9}$$

where K(h) is the saturated hydraulic conductivity and l is a pore-connectivity parameter.

The integration of equation 9 can be facilitated by substituting the inverse of equation 7 and allowing the restriction m=1-1/n to the permissible values for m and n. This results in

$$K(S_e) = K_s S_e^l \left[1 - \left(1 - S_e^{1/m}\right)^m\right]^2 \tag{10}$$

For a complete description and derivation of these equations the reader is referred to Van Genuchten et al. (1991). The equations 6 (or 7) and 10 give the soil hydraulic functions and are referred to as the Van Genuchten equations.

The RETC computer code (Van Genuchten et al. 1991) was used to fit the parameters in the Van Genuchten equations to the values of the water retention curve and unsaturated hydraulic conductivity curve. Results of the parameter fitting and a description on how RETC was used will be given in Chapter 4.

3. Experimental procedures

3.1 Site characteristics

The instantaneous profile experiments were conducted in the summer of 1991 at the NMSU ARC near Clovis, located in the High Plains region of eastern New Mexico. Mean annual precipitation in the area is approximately 400 mm and the average relative humidity is below 40%. The soil series is an Olton clay-loam (fine, mixed, thermic Aridic Paleustoll; previously called the Pullman series) which is representative of vast areas of the High Plains of New Mexico and Texas. The soils have developed from fine-textured, calcareous materials deposited by wind. Table 1 shows the descriptions of the soil profile at the experimental site and at a site approximately 200 meters south of the experimental site. For complete soil descriptions, as presented by the USDA Soil Conservation Service, the reader is referred to Appendix A. The B-horizon of the soil profile, from the Bt to the Btk2 layer, shows indications of buried ploughlayers.

The textural composition of the soil at this site is 46% sand, 24% silt, 30% clay, the organic matter content is approximately 1% and the pH is 7.4.

Table 1 *Soil profile descriptions.*

Profile at the experimental site			Profile approximately 200 meters south of the experimental site		
Ap	0- 17 cm	clay-loam	Ap	0- 20 cm	clay
Bt	17- 30 cm	clay	Bt	20- 45 cm	clay
Btk1	30- 63 cm	clay-loam	Btk1	45- 91 cm	clay-loam
Btk2	63-114 cm	clay-loam	Btk2	91-132 cm	clay-loam
Btk3	114-165 cm	clay	Btk3	132-160 cm	clay-loam
Btk4	165-223 cm	clay-loam	Ab	160-175 cm	loam
Btk5	223-274 cm	clay-loam	Btk1b	175-190 cm	clay-loam
			Btk2b	190-228 cm	silty clay-loam
			Btk3b	228-269 cm	silty clay-loam

3.2 Measurements of soil water content and water tension

The two experimental plots were installed in a 3-years no-tillage field and in a conventional or clean tillage field. The crop rotation is a continuous grain-sorghum rotation. The crops are planted on beds and irrigation is applied in furrows. Under the conventional tillage system

all crop residue is incorporated to a depth of 20 cm before sowing a new crop.

An aerial and side view of the two experimental plots is presented in Appendix B. The plots were approximately 65 m^2 with presumably no significant differences in soil layering or soil physical behaviour. Tensiometers and neutron probe access pipes were installed in the center of each plot, where processes were presumed to be unaffected by its boundaries. A total of 7 sets of 6 tensiometers and 1 neutron probe access pipe were installed in each experimental plot; 4 sets in the furrows and 3 sets on top of the beds. The tensiometers and neutron probe access pipes were installed in randomized order and 50 cm apart from each other.

Tensiometers in the conventional tillage plot were installed at 5 different depths: 25, 50, 75, 100 and 150 cm, and in the no-tillage plot at 6 depths: 25, 50, 75, 100, 150 and 200 cm. The tensiometers were made by a technician at the research center and consisted of a ceramic cup, a PVC pipe, a clear plastic pipe and a rubber stopper. A 5 cm long piece of clear plastic was glued to the top end of a 1.8 cm diameter PVC pipe. The ceramic cup of 5 cm in length, with the same diameter as the PVC pipe, was glued to the bottom end of the pipe using water-resistant epoxy. The tensiometers remained 15 cm above the soil surface to facilitate the measurements and refilling with water. The top end was sealed with a rubber stopper which was filled with silicone, in order to achieve a better sealing after penetrating the stopper with a needle for the soil water tension measurement. The top ends were covered with film cans to prevent algae growth in the clear plastic and to protect the rubber stoppers from the radiation of the sun. The holes for the installation of the tensiometers were made with a hammer. Due to the dry period preceding installation of the first plot, it was not possible to drill deep enough holes for the installation of the 200 cm tensiometers in the conventional tillage plot. The soil water tension was measured with a Tensimeter; an electrical transducer to measure the tension inside the tensiometer. For the analysis of the collected data the top of the beds was chosen as the reference level (z=0).

Aluminum pipes with a diameter of 6.5 cm were used for the soil water content measurements. The access pipes were installed with a hydraulic device mounted on the back of a small tractor and were secured with a rubber stop to prevent precipitation and dirt entering the pipe. Water content was measured with a Troxler 3300 series depth moisture gauge (more commonly referred to as a neutron probe) every 20 cm to a depth of 200 cm. The neutron probe was calibrated in situ and the results are presented in Appendix C.

After preparation, the plots were ponded and a 15 cm water layer was maintained on the surface until the tensiometer readings became steady. To obtain an estimate of the saturated hydraulic conductivity, the rate of infiltration was measured before disconnecting the water supply. The soil profile of the conventional tillage site was completely wet to a depth of 2 meters after 7 days and the no-tillage plot was completely wet to the same depth after 9 days. The no-tillage plot became wet outside its borders. This could have been caused by more lateral flow in the rootzone in the no-tillage than in the conventional tillage plot. This idea is reinforced by the fact that the amount of water needed to saturate the no-tillage profile was substantially larger.

After complete wetting the soil was covered with plastic to prevent evaporation and infiltration and to maintain a downward flux. As the infiltration and drainage processes proceeded, water tension and water content measurements were taken periodically throughout

the profile. At first the readings were taken frequently (3-4 times daily), but once the infiltration and drainage processes slowed down, the time intervals were increased. The rubber stoppers on the tensiometers started leaking air after approximately 10 - 15 measurements and attempts were made to replace them before leakage started. In practice this was not always achieved, which meant the loss of vacuum between consecutive measurements, and resulted in the rejection of measurements. As the soil profile became drier with the proceeding drainage, the tensiometers needed to be refilled. To ensure that the water in the tensiometer had reached equilibrium with the soil surrounding the ceramic cup, this was done at least one day before the next measurement. The measurements were continued for 101 and 90 days on the conventional tillage and no-tillage plots respectively. Measurements were stopped because it became impossible to keep up with rodents perforating the plastic and therefore causing water infiltration into the soil profile.

4. Data analysis and results

The original tensiometer and neutron probe readings, as collected in the field, are listed in Appendices D and E, respectively. The tensiometric data were checked on outliers and measurement errors, before being used in the analysis of both data sets. The volumetric water contents, presented in Appendix F, were calculated using the equation of the calibration curve of the neutron probe.

4.1 Determination of unsaturated hydraulic conductivities

All 14 data sets, 7 conventional tillage and 7 no-tillage, of water tension and volumetric water content measurements were analysed using the same procedure to determine the unsaturated hydraulic conductivity for a certain water content. The procedure used was similar to the ones presented by Hillel et al. (1972) and Green et al. (1986) and will be presented here by using the data of set 5 from the conventional tillage plot as an example.

1 Hydraulic heads, H(z,t), were calculated from the measured tensiometric data. Following Chong et al. (1981), it was assumed that the soil water pressure head, h(t), at each depth could be expressed as a power function of time during the redistribution period. That is,

$$h = at^{b} \qquad (11)$$

where a and b are constants. The fitting was done with SAS and gave satisfactory results (with a regression coefficient (r^2) between 0.74 and 0.99) which made further analysis of the data easier. Graphical representations of the fitted curves and the measured tensiometric heads are shown in Appendix G. The constants a and b along with the r^2's are listed in Appendix H. In Figure 1 the measured data points and the fitted curves for each depth are shown for set 5 in the conventional tillage plot.

2 Hydraulic heads for each depth were determined at the time steps 1, 2, 5, 10, 20, 40 and 80 days after drainage started and the hydraulic head profile at each time step was plotted. The hydraulic gradients at different times were determined by measuring the slopes at each depth. Figure 2 shows the hydraulic head profiles of set 5 in the conventional tillage plot. Most of the methods currently used to determine hydraulic conductivity assume a unit hydraulic gradient. In this analysis a hydraulic gradient in the range of 0.4 to 2.9 was found and in most cases a hydraulic gradient larger than 1 was measured. The determined hydraulic gradients for set 5 in the conventional tillage plot are presented in the fourth column of Table 2. In Figure 2 the hydraulic head profiles of the example set are shown.

Figure 1 *Measured hydraulic heads over time and fitted curves for conventional tillage, set 5.*

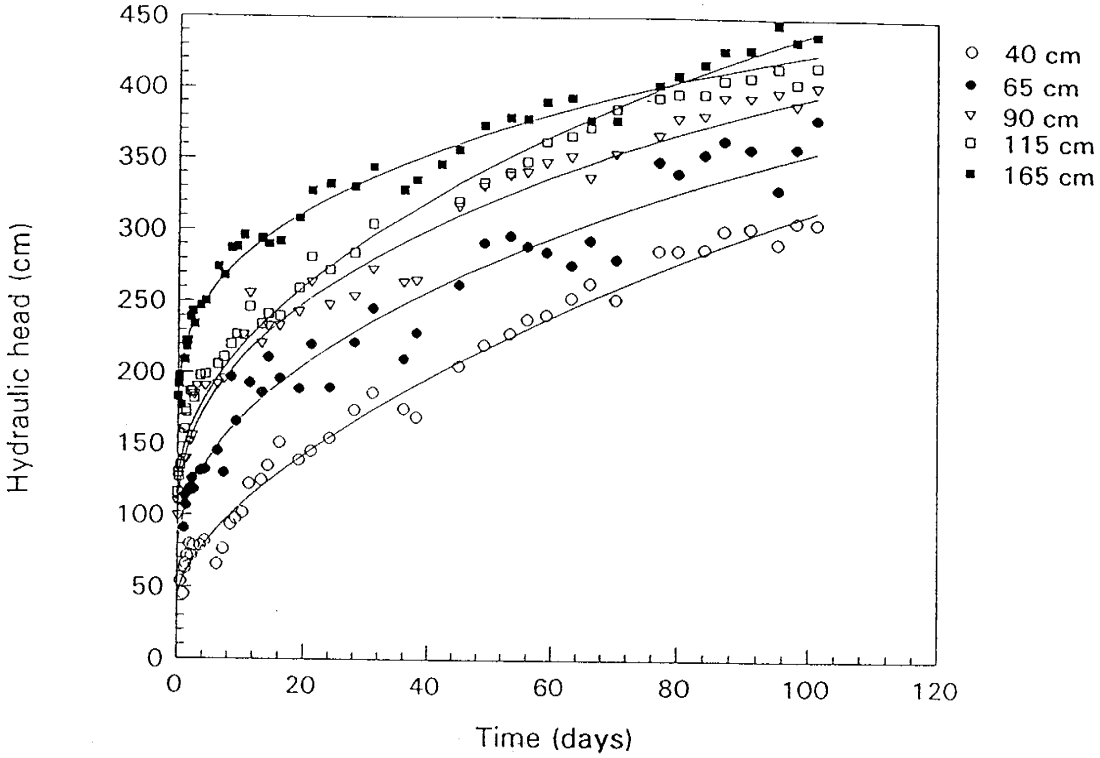
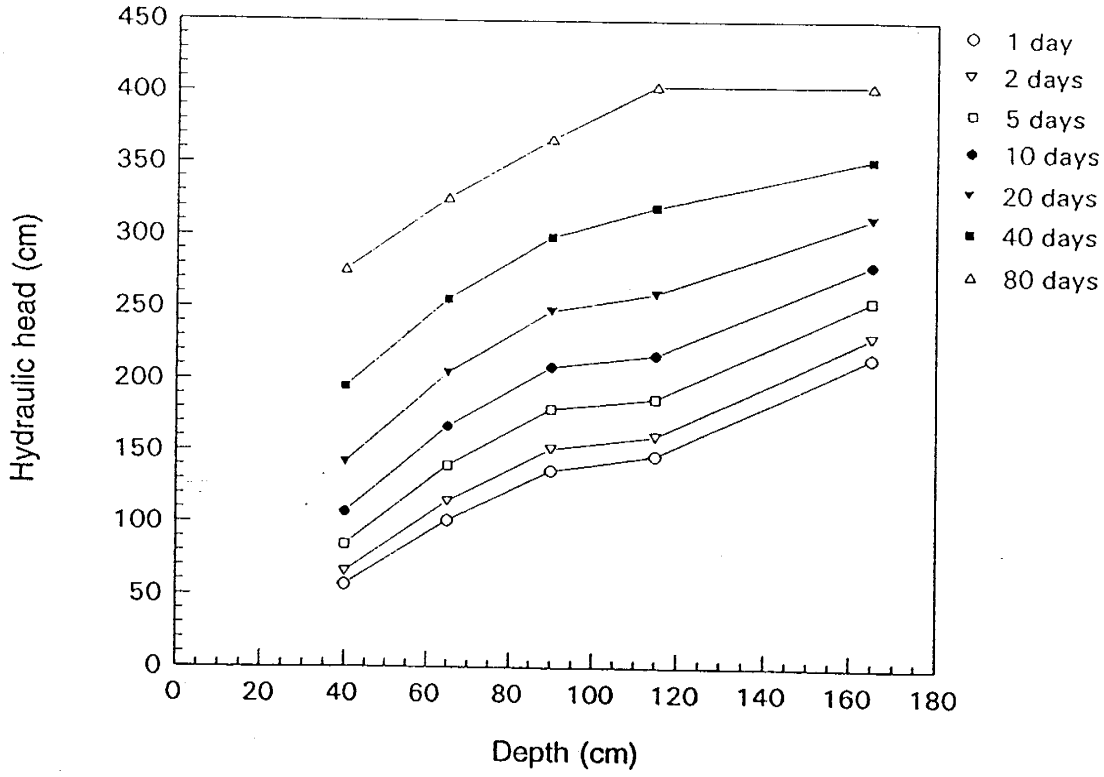


Figure 2 *Hydraulic head profiles for conventional tillage, set 5.*

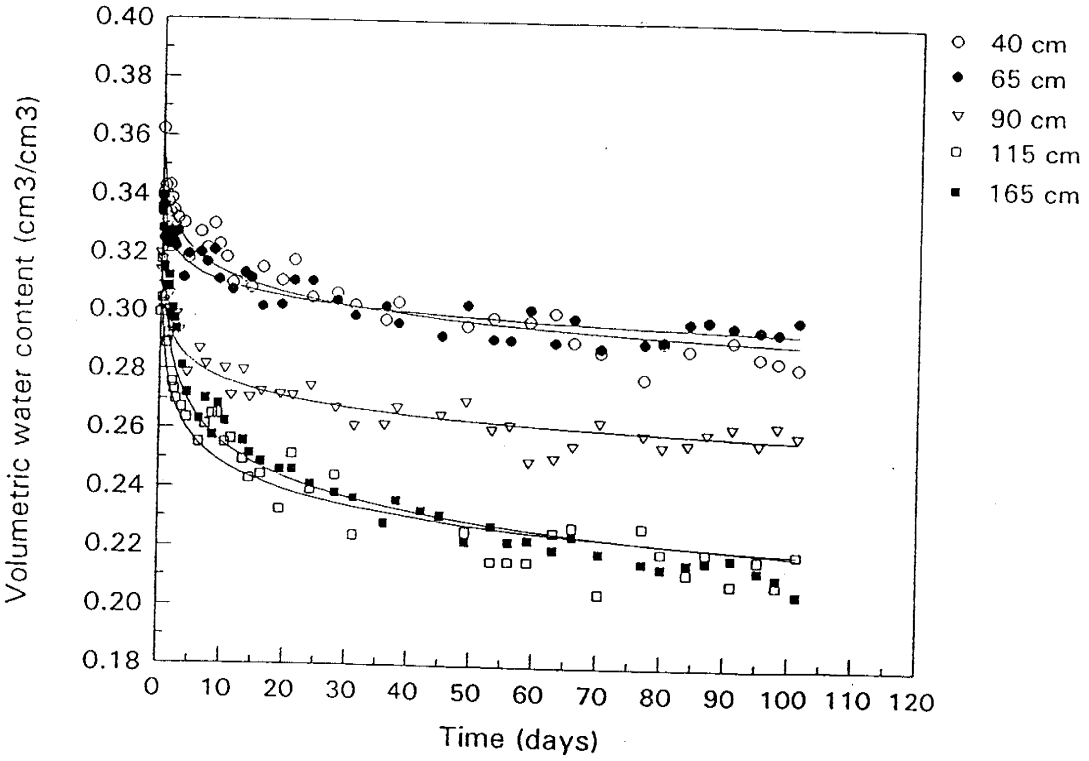


3 Following (among others) Richards et al. (1956) and Chong et al. (1981), it was assumed that the volumetric soil water content in the profile would diminish following a power function of time after the soil surface had been covered. That is;

$$\theta = ct^{d} \qquad (12)$$

where c and d are constants. The fitted curves with the measured volumetric water contents are presented in Appendix G and the constants c and d with the r^2 values are presented in Appendix I. The measured points and fitted curves for set 5 in the conventional tillage plot are presented in Figure 3.

Figure 3 *Measured volumetric water contents and fitted curves for conventional tillage, set 5.*



4 The derivatives of the curves determined in step 3 were used to calculate the slope of the water content curves and, successively, the fluxes at fixed depths and times. As changes in the water content after appproximately 40 days were very slow, the fluxes after this time also became very small. The fluxes calculated for set 5 of the conventional tillage plot are presented in the second column of Table 2.

5 The unsaturated hydraulic conductivity values were obtained by dividing the fluxes calculated in step 4 by the hydraulic gradients calculated in step 2. As the hydraulic gradients in most cases were larger than 1, this resulted in lower hydraulic conductivities than would have been obtained by assuming a unit gradient for this soil profile. The conductivity values are valid for the average water tension and water content at the corresponding depths and times.

Table 2 *Results of data analysis of the measured values in set 5, conventional tillage.*

depth (cm)	time (days)	q (cm/day)	Hydraulic gradient (-)	K(θ) (cm/day)	average water content (cm^3/cm^3)
15-52.5	1	0.4252	1.540	0.2761	0.3495
52.5-67.5		0.6108	1.600	0.3817	0.3310
67.5-102.5		0.8424	0.933	0.9033	0.3095
102.5-140		1.4152	0.810	1.7480	0.2941
140-177.5		2.1657	1.327	1.6320	0.3213
15-52.5	2	0.2077	1.540	0.1349	0.3350
52.5-67.5		0.2991	1.664	0.1797	0.3241
67.5-102.5		0.4124	0.810	0.5093	0.2943
102.5-140		0.6882	0.781	0.8809	0.2763
140-177.5		1.0464	1.376	0.7603	0.2910
15-52.5	5	0.0806	1.664	0.0484	0.3261
52.5-67.5		0.1164	1.881	0.0619	0.3183
67.5-102.5		0.1604	0.810	0.1981	0.2871
102.5-140		0.2654	0.675	0.3935	0.2645
140-177.5		0.4001	1.376	0.2907	0.2757
15-52.5	10	0.0394	1.804	0.0218	0.3174
52.5-67.5		0.0570	2.050	0.0278	0.3125
67.5-102.5		0.0785	0.839	0.0936	0.2799
102.5-140		0.1291	0.700	0.1844	0.2531
140-177.5		0.1934	1.280	0.1511	0.2612
15-52.5	20	0.0192	1.804	0.0107	0.3102
52.5-67.5		0.0279	1.963	0.0143	0.3076
67.5-102.5		0.0384	0.900	0.0427	0.2739
102.5-140		0.0628	0.700	0.0897	0.2438
140-177.5		0.0935	1.150	0.0813	0.2493
15-52.5	40	0.0094	1.732	0.0054	0.3030
52.5-67.5		0.0137	1.963	0.0070	0.3028
67.5-102.5		0.0188	1.192	0.0158	0.2681
102.5-140		0.0305	0.727	0.0420	0.2348
140-177.5		0.0452	0.900	0.0502	0.2379
15-52.5	80	0.0046	1.327	0.0035	0.2961
52.5-67.5		0.0067	1.732	0.0039	0.2980
67.5-102.5		0.0092	1.540	0.0060	0.2623
102.5-140		0.0149	0.510	0.0292	0.2261
140-177.5		0.0218	0.466	0.0469	0.2271

The unsaturated hydraulic conductivity values for all sets are presented in Figures 4 A through 4 D. In these figures K(θ), values which are expected to be close to each other, based on the experimental plot (conventional or no-tillage) and the positioning within the plot

(installed in the bed or furrow), are presented in the same figure. Figure 4A shows roughly three different layers with approximately the same hydraulic conductivity for sets 1, 3, 5, and 7 in the conventional tillage plot. In Figure 4B this layering is less apparent. The hydraulic conductivities of the no-tillage plots (Figures 4C and 4D) do not give any indication of certain discrete layers in the soil profile.

Figure 4A *Unsaturated hydraulic conductivity, conventional tillage, sets 1, 3, 5, 7.*

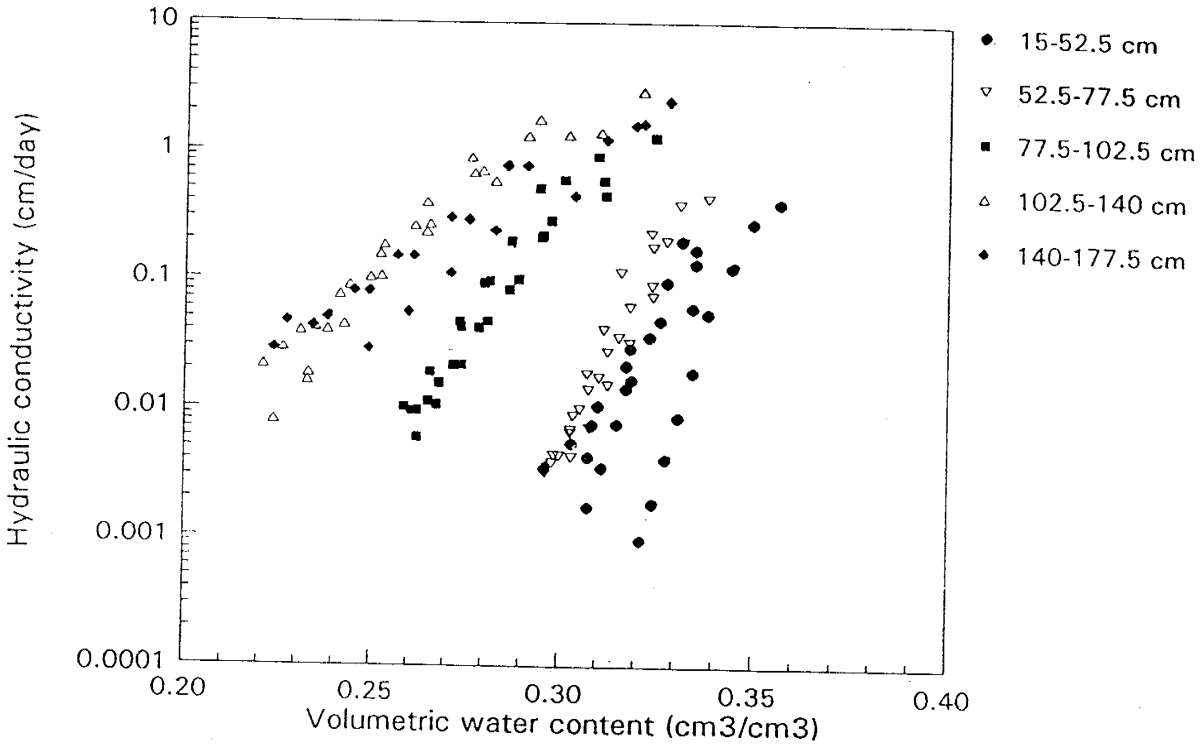


Figure 4B *Unsaturated hydraulic conductivity, conventional tillage, sets 2, 4, 6.*

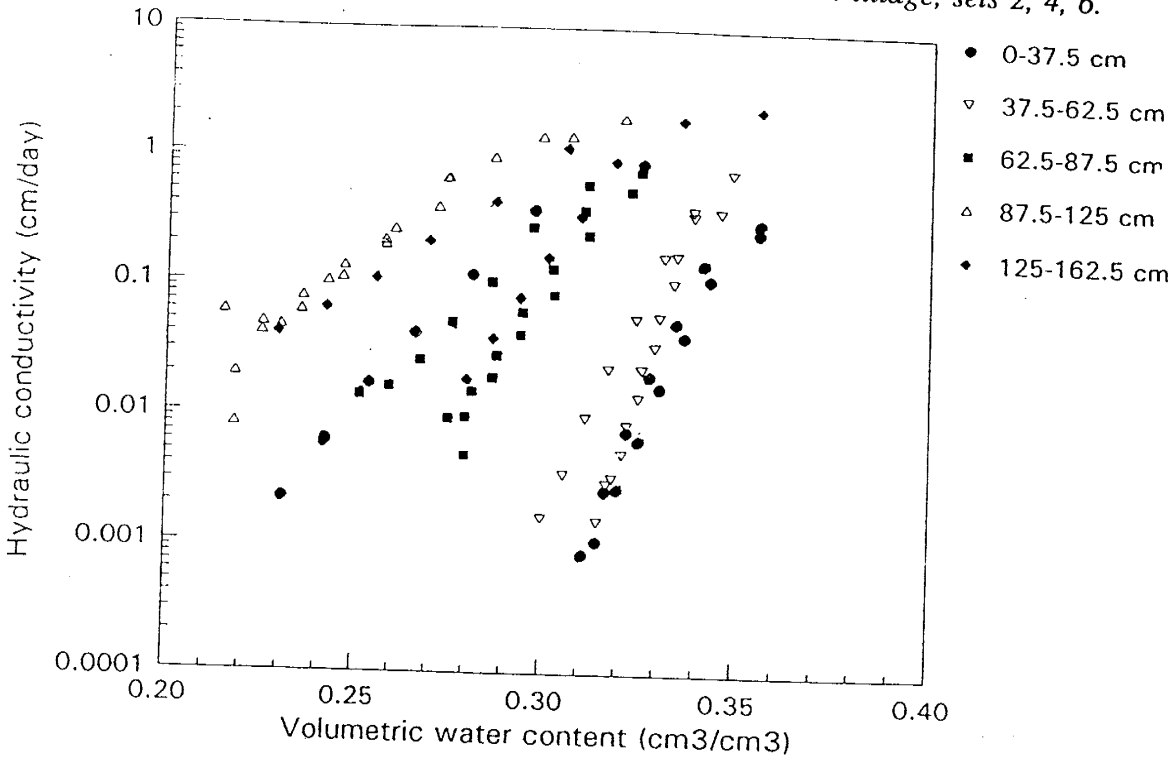


Figure 4C *Unsaturated hydraulic conductivity, no-tillage, sets 1, 3, 5, 7..*

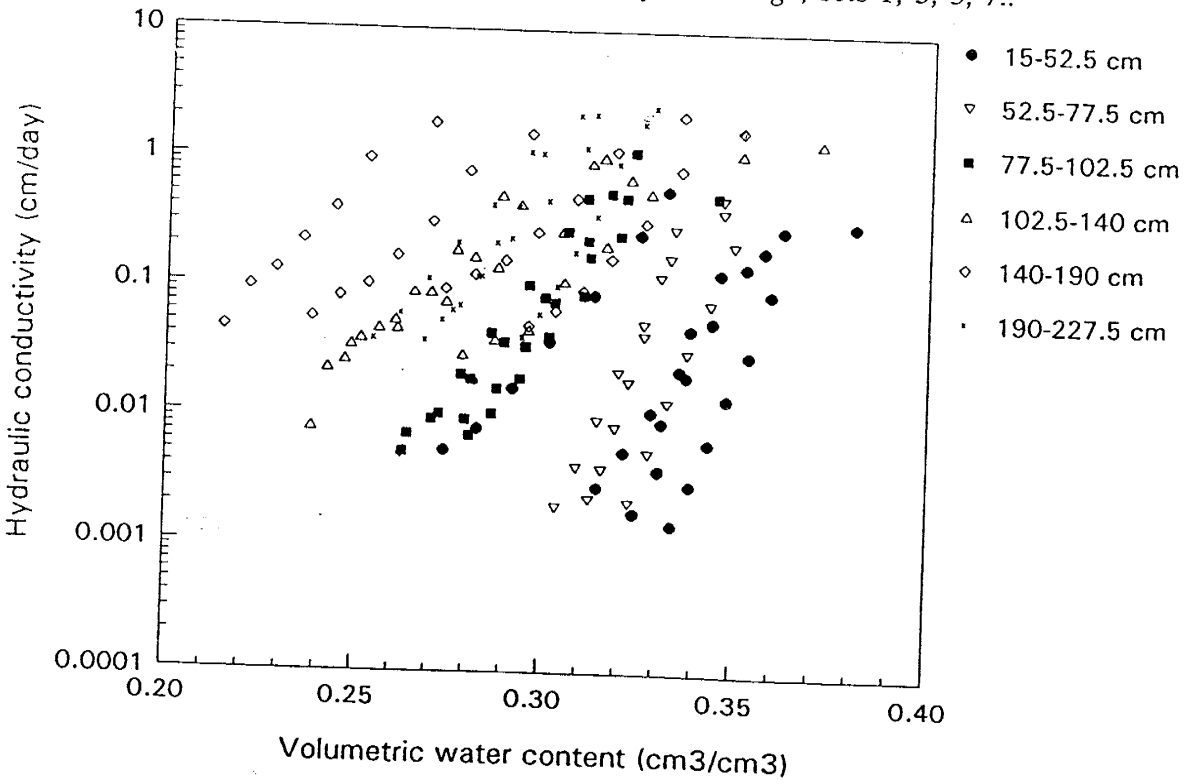
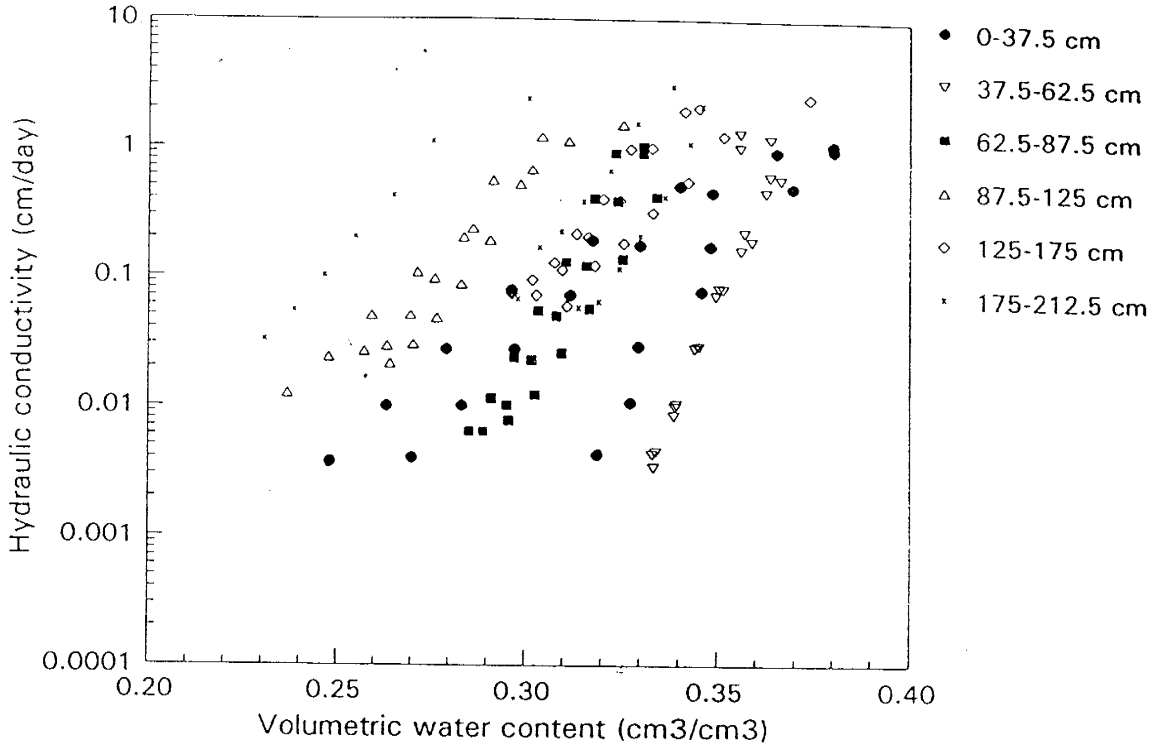


Figure 4D *Unsaturated hydraulic conductivity, no-tillage, sets 2, 4, 6..*



The water retention and hydraulic conductivity values that were used for the fitting of the Van Genuchten parameters are shown in the graphs in Appendix J. The fitting is described in Section 4.2.

4.2 Parameter estimation using RETC

The measured water retention values and calculated unsaturated hydraulic conductivity data were simultaneously fitted to the best possible fit of both curves with the nonlinear least-squares optimization program RETC. Yates et al. (1992) found that RETC describes soil hydraulic parameters most accurately when a method with 5 and/or 6 parameters is used for both the water retention and hydraulic conductivity relationships. In this study only a limited range of retention values was available in the wet range. Therefore the residual volumetric water content (θ_r) was based on the lowest measured value in a 2-year period at the ARC. θ_r was fixed at a value of 0.05 cm^3/cm^3. Each fitting procedure was first run with 5 variable parameters: the saturated volumetric water content (θ_s), the shape parameters α, n and l and the saturated hydraulic conductivity (K_{sat}). RETC offers several possible options for analysing calculated conductivity data. The method in which a log transformation is applied to the conductivity data was proven to yield the most reliable results for most data sets in this study. Depending on the results of the first fit, which was graphically checked with the measured data, other runs were made with a smaller number of variables, a different type of conductivity data used in the optimization process, and/or with less weight given to the

hydraulic conductivity data. The hydraulic conductivity data are less precise than the retention data because they were calculated from the water retention data. Placing less weight on the hydraulic conductivity data in some cases proved to result in a better estimate of the soil hydraulic properties. The fitting process showed that it is not possible to give a standard recipe for all the data sets. Table 3 lists the options that were used for the optimization of the parameters. All the data sets differ just enough to make the search for the best fit almost a trial and error procedure.

Table 3 *Different options used for the optimization process with RETC and the number of times each option has been used.*

Options used for fitting procedure	conventional tillage	no-tillage
5 variables, log transformed K(θ) data, weight K(θ) data = 1	22	14
5 variables, log transformed K(θ) data, weight K(θ) data between 0.5 and 0.8	5	9
4 variables (l fixed at 0.5), log transformed K(θ) data, weight K(θ) data = 1	3	9
4 variables (l fixed at 0.5), log transformed K(θ) data, weight K(θ) data between 0.5 and 0.8	3	3
4 variables (l fixed at 0.5), K(θ) data, weight K(θ) data between 0.5 and 0.8	-	1
4 variables (θ_s arbitrarily fixed), log transformed K(θ) data, weight K(θ) data = 1	-	3
3 variables (l fixed at 0.5 and θ_s arbitrarily fixed), log transformed K(θ) data, weight K(θ) data = 1	-	2

In Figures 5 and 6 the estimated curves, determined with RETC, and the measured data are presented for conventional tillage, set 5. In Tables 4 and 5 the result of the optimization with RETC is presented for all the data sets collected in this study.

Figure 5 *Measured values and estimated water retention curve, conventional tillage, set 5.*

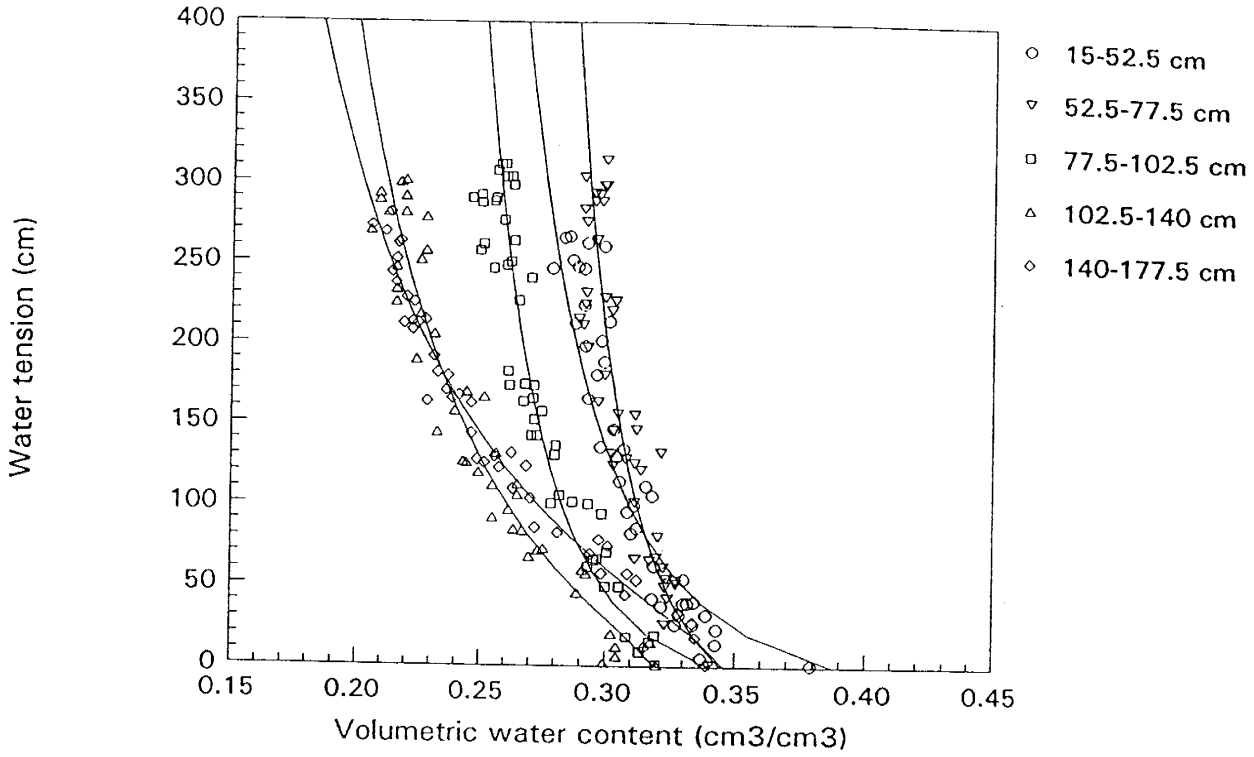


Figure 6 *Calculated values and estimated unsaturated hydraulic conductivities, conventional tillage, set 5.*

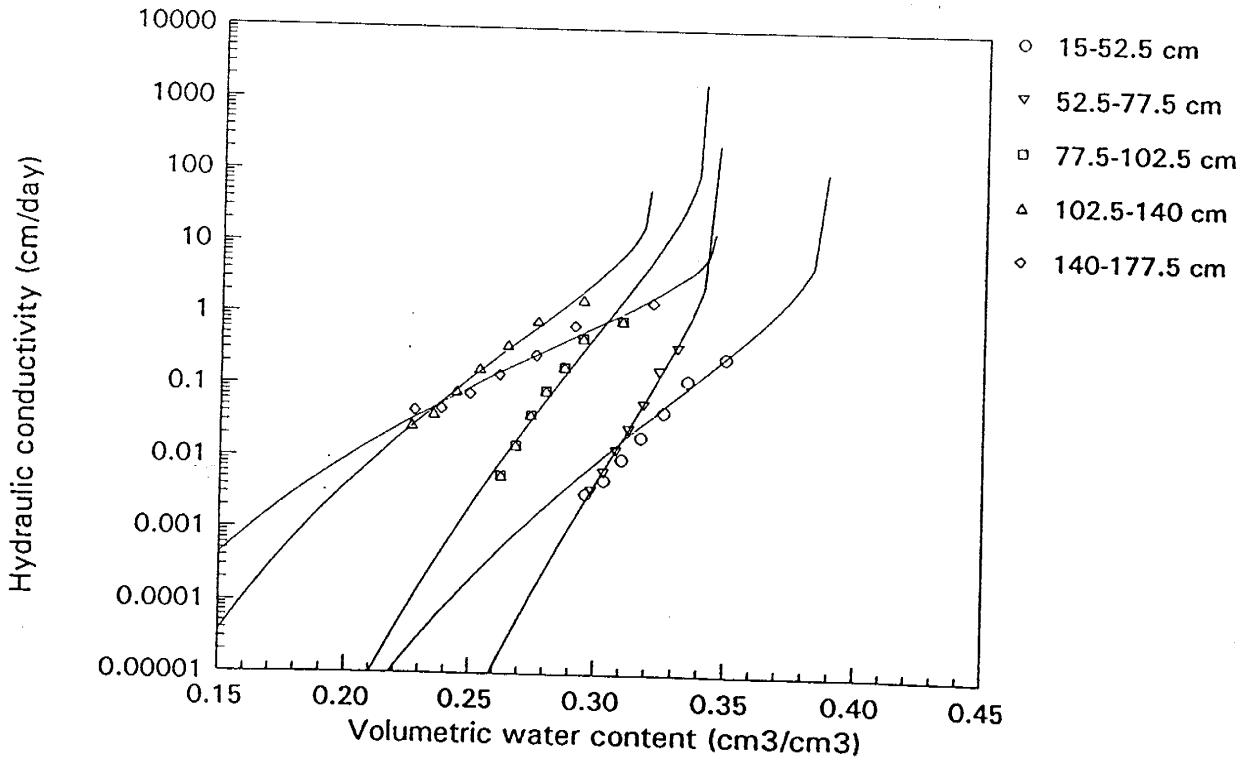


Table 4 *Van Genuchten parameters for the conventional tillage plot determined with RETC.*

conventional tillage									
set	depth (cm)	wcr (-)	wcs (-)	alpha (cm^{-1})	n (-)	m (-)	l (-)	K_{sat} (cm\day)	R^2 (-)
1	15-52.5	0.05	0.416	0.3780	1.105	0.095	2.509	2439.721	0.998
	52.5-77.5	0.05	0.350	0.0173	1.119	0.107	8.392	59.449	0.997
	77.5-102.5	0.05	0.359	0.0788	1.133	0.117	0.500	875.608	0.987
	102.5-140	0.05	0.373	0.0311	1.299	0.230	3.209	432.307	0.982
	140-177.5	0.05	0.362	0.0280	1.235	0.191	1.166	142.576	0.995
2	0-37.5	0.05	0.351	0.0945	1.222	0.182	2.161	72.192	0.993
	37.5-62.5	0.05	0.364	0.1003	1.051	0.048	9.167	4954.049	0.993
	62.5-87.5	0.05	0.354	0.0448	1.122	0.109	3.247	476.130	0.997
	87.5-125	0.05	0.352	0.0204	1.341	0.254	0.500	56.675	0.990
	125-162.5	0.05	0.394	0.0229	1.416	0.294	0.500	52.945	0.986
3	15-52.5	0.05	0.341	0.0241	1.072	0.067	16.31	96.163	1.000
	52.5-77.5	0.05	0.339	0.0355	1.074	0.069	10.72	326.043	0.998
	77.5-102.5	0.05	0.333	0.0188	1.192	0.161	3.512	38.520	0.997
	102.5-140	0.05	0.342	0.0221	1.323	0.244	0.872	51.579	0.991
	140-177.5	0.05	0.357	0.0184	1.400	0.286	1.571	42.899	0.993
4	0-37.5	0.05	0.378	0.0912	1.092	0.085	13.05	487.416	0.996
	37.5-62.5	0.05	0.359	0.0972	1.070	0.065	5.495	826.509	1.000
	62.5-87.5	0.05	0.325	0.0173	1.201	0.167	0.500	16.211	0.997
	87.5-125	0.05	0.337	0.0260	1.305	0.234	-1.64	32.795	0.989
	125-162.5	0.05	0.364	0.0301	1.164	0.141	5.964	556.596	0.993
5	15-52.5	0.05	0.388	0.0681	1.132	0.117	0.000	112.501	0.991
	52.5-77.5	0.05	0.346	0.0399	1.078	0.072	6.256	264.011	0.999
	77.5-102.5	0.05	0.340	0.0675	1.110	0.099	4.179	1855.114	0.987
	102.5-140	0.05	0.320	0.0161	1.306	0.235	3.064	62.400	0.995
	140-177.5	0.05	0.345	0.0128	1.461	0.316	1.263	15.387	0.993
6	0-37.5	0.05	0.396	0.1405	1.112	0.101	0.500	286.945	0.989
	37.5-62.5	0.05	0.376	0.1019	1.078	0.072	0.500	827.671	0.979
	62.5-87.5	0.05	0.345	0.0519	1.108	0.098	2.994	274.355	0.996
	87.5-125	0.05	0.340	0.0432	1.258	0.205	1.425	167.221	0.987
7	15-52.5	0.05	0.352	0.0088	1.139	0.122	35.93	11.865	0.999
	52.5-77.5	0.05	0.342	0.0275	1.087	0.080	2.635	37.074	0.998
	77.5-102.5	0.05	0.341	0.0226	1.188	0.159	6.560	132.041	0.997
	102.5-140	0.05	0.340	0.0251	1.288	0.223	4.210	163.008	0.991

Table 5 *Van Genuchten parameters for the no-tillage plot determined with RETC.*

no-tillage									
set	depth (cm)	wcr (-)	wcs (-)	alpha (cm^{-1})	n (-)	m (-)	l (-)	K_{sat} (cm/day)	R^2 (-)
1	15-52.5	0.05	0.394	0.9428	1.060	0.057	4.518	6902.292	0.986
	52.5-77.5	0.05	0.362	0.0287	1.124	0.110	0.500	39.399	0.982
	77.5-102.5	0.05	0.380	0.0557	1.168	0.144	0.500	151.244	0.991
	102.5-140	0.05	0.432	0.0443	1.270	0.212	0.500	351.917	0.995
	140-190	0.05	0.356	0.0166	1.216	0.178	0.000	74.407	0.993
	190-227.5	0.05	0.342	0.0305	1.149	0.129	7.077	1104.025	0.991
2	0-37.5	0.05	0.390	0.0552	1.230	0.187	10.290	21.766	0.986
	37.5-62.5	0.05	0.385	0.2389	1.046	0.044	0.500	4637.613	0.991
	62.5-87.5	0.05	0.327	0.0181	1.096	0.087	0.500	18.762	0.994
	87.5-125	0.05	0.332	0.0225	1.149	0.129	3.136	157.044	0.997
	125-175	0.05	0.361	0.0153	1.162	0.139	3.240	169.596	0.994
	175-212.5	0.05	0.355	0.0036	1.430	0.300	19.709	10.595	0.992
3	15-52.5	0.05	0.385	0.0365	1.137	0.121	0.500	14.711	0.984
	52.5-77.5	0.05	0.356	0.0473	1.048	0.045	3.950	244.134	0.990
	77.5-102.5	0.05	0.324	0.0110	1.139	0.122	0.500	7.072	0.990
	102.5-140	0.05	0.332	0.0151	1.258	0.205	0.350	21.100	0.998
	140-190	0.05	0.299	0.0242	1.242	0.195	1.232	144.606	0.993
	190-227.5	0.05	0.321	0.0062	1.538	0.350	9.483	14.905	0.998
4	0-37.5	0.05	0.405	0.0903	1.257	0.204	0.500	47.135	0.989
	37.5-62.5	0.05	0.368	0.0116	1.108	0.098	18.577	30.333	0.998
	62.5-87.5	0.05	0.341	0.0288	1.087	0.080	0.500	64.359	0.986
	87.5-125	0.05	0.350	0.0939	1.116	0.104	0.500	2370.747	0.995
	125-175	0.05	0.358	0.0086	1.227	0.185	5.176	39.962	0.993
	175-212.5	0.05	0.336	0.0190	1.309	0.236	4.031	176.281	0.990
5	15-52.5	0.05	0.364	0.0274	1.065	0.061	10.272	21.640	0.995
	52.5-77.5	0.05	0.344	0.0451	1.049	0.047	13.847	492.968	1.000
	77.5-102.5	0.05	0.321	0.0187	1.149	0.130	2.918	21.856	1.000
	102.5-140	0.05	0.343	0.0381	1.194	0.162	0.500	129.677	0.989
	140-190	0.05	0.361	0.0568	1.198	0.166	0.500	888.215	0.993
	190-227.5	0.05	0.337	0.0070	1.236	0.191	17.230	56.385	0.998
6	0-37.5	0.05	0.405	0.1433	1.169	0.145	0.500	191.206	0.998
	37.5-62.5	0.05	0.370	0.0315	1.069	0.064	16.967	279.325	0.973
	62.5-87.5	0.05	0.360	0.1112	1.087	0.080	3.295	2264.250	0.997
	87.5-125	0.05	0.378	0.0614	1.205	0.170	0.500	392.337	0.997
	125-175	0.05	0.395	0.0085	1.324	0.245	6.469	56.186	0.988
	175-212.5	0.05	0.355	0.0105	1.209	0.173	8.949	143.341	0.994
7	15-65	0.05	0.344	0.0501	1.134	0.118	0.500	39.098	0.998
	65-102.5	0.05	0.326	0.0077	1.179	0.152	6.939	10.411	0.998
	102.5-140	0.05	0.372	0.0201	1.204	0.170	0.500	56.096	0.992
	140-190	0.05	0.371	0.0112	1.243	0.195	5.347	58.130	0.995
	190-227.5	0.05	0.364	0.0228	1.232	0.188	5.945	416.880	0.995

5. Conclusions and recommendations

Overall the instantaneous profile experiments, as conducted in this study, yielded very satisfactory results and a reliable data set for future computer modeling was established. The slow drainage of the clay-loam soil at the site and practical limitations to the duration of the experiments resulted in measurements in a limited range of water content. The data set is thought to be representative for the soil type under consideration since these are the water contents that can be expected in these soils when under irrigation.

Although the differences in hydraulic properties between the conventional and no-tillage were not very large, the data indicate that the spatial variability, in both horizontal and vertical direction, in the no-tillage plot is larger than in the conventional tillage plot. Using the hydraulic conductivities, a layering was found in the conventional tillage which was not apparent in the no-tillage. The fact that it was easier to fit the conventional tillage data with RETC reinforces the conclusions regarding larger variability in the no-tillage plot. Fitting of the no-tillage character sets called for 7 different combinations of parameters, versus 4 for the conventional data.

During the flooding of the plots it was noticed that the lateral flow in the no-tillage plot was larger than in the conventional tillage. This could have been caused by buried ploughlayers, which impede the vertical movement of soil water and force the soil water in a lateral direction. However, the fact that the wetness outside the borders of the no-tillage plot was significantly greater than that ouside the conventional tillage would seem to indicate that the preferential flowpaths in the no-tillage must have been more developed.

Improvement of the water retention curve could be achieved by taking undisturbed soil samples near the experimental site, which then could be analysed in a lab to measure the water content at low water tension. This would give additional points from which to get a more accurate extrapolation of the water retention curve.

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APPENDICES

OF

In situ field experiments to determine the soil physical characteristics of soils under conventional and no-tillage management systems

March 1994

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Appendices

Appendix A: Soil descriptions.
Appendix B: Design of both experimental plots.
Appendix C: Calibration of the neutron probe.
Appendix D: Tensiometric data from conventional and no-tillage plots.
Appendix E: Conventional and no-tillage original neutron probe readings.
Appendix F: Volumetric water contents calculated from neutron probe measurements.
Appendix G: Measured and fitted soil water tension and volumetric water content for all data sets.
Appendix H: Coefficients of the soil water tension curves.
Appendix I: Coefficients of the volumetric water content curves.
Appendix J: Soil water retention and hydraulic conductivity values for all data sets.

Appendix A: Soil descriptions.

Soil survey	# S92-NM-669-011	
Location	NMSU Research Center North of Clovis, NM. Approximately 200 meters south of experimental sites.	
Classification	fine, mixed, thermic Aridic Paleustoll	
Parent materials	eolian from mixed material	
Soil series	Olton	
Geographically associated soils	Acuff, Portales, Randall	
Diagnostic horizons	0 - 45 cm 20-203 cm 45-203 cm	mollic argillic calcic
Described by	Robert A. Hill and Kenneth F. Scheffe (USDA, Soil Conservation Service)	
Date	May 20,1992	
Description:		
Ap	0 - 20 cm	99% dark reddish gray (5YR 4/2) crushed clay; 99% dark reddish brown (5YR 3/2) crushed moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic, moderate rupture resistance; common very fine and fine roots and few medium roots throughout; few very fine interstitial and tubular pores; fine stratification in upper part due to irrigation in furrow; very slightly effervescent (HCl, 1 normal); abrupt smooth boundary
Bt	20- 45 cm	99% reddish brown (5YR 4/3) crushed clay; 99% dark reddish brown (5YR 3/2)crushed moist; moderate coarse prismatic structure breaking into moderate angular blocks; hard, firm, moderately sticky, moderately plastic, moderate rupture resistance; common very fine and fine roots throughout; few very fine interstitial and tubular pores; common distinct discontinuous clay films (cutans) on faces of peds and in pores; abrupt smooth boundary
Btk1	45- 91 cm	99% reddish brown (5YR 4/2) clay loam; 99% reddish brown (5YR 4/4) moist; moderate coarse prismatic structure parting to moderate medium angular blocky; hard, firm, moderately sticky, moderately plastic, moderate rupture resistance; common very fine roots throughout; few very fine and fine interstitial and tubular pores; abundant mycelia from 69 to 91 centimeters; very few distinct continuous clay films (cutans); common carbonate threads; slightly effervescent (HCl, 1 normal) continuous; gradual smooth boundary
Btk2	91-132 cm	99% pink (5YR 8/4) crushed clay loam; 99% pink (5YR 7/4) crushed moist; moderate coarse subangular blocky structure; slightly hard, friable, very sticky, moderately plastic; many very fine roots between peds; many very fine and fine interstitial pores; very few distinct patchy clay films (cutans) on faces of peds and in pores; common soft masses of lime; violently effervescent (HCl, 1 normal) continuous, gradual smooth boundary

Btk3	132-160 cm	99% reddish yellow (5YR 6/6) crushed clay loam; yellowish red (5YR 5/6) crushed moist; moderate medium subangular blocky structure; slightly hard, friable, very sticky, moderately plastic; many very fine and fine roots between peds; many very fine and fine vesicular pores: few distinct patchy clay films (cutans) on faces of peds; many irregular soft masses of carbonate; violently effervescent (HCl, unspecified) continuous; gradual smooth boundary
Ab	160-175 cm	99% light brown (7.5YR 6/4) crushed loam; 99% brown (7.5YR 5/4) crushed moist; weak fine and medium subangular blocky structure parting to weak fine and medium subangular blocky; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots between peds; many very fine and fine interstitial pores; common irregular soft masses of carbonate; violently effervescent (HCl, unspecified) continuous; gradual smooth boundary
Btk2b	175-190 cm	99% light reddish brown (5YR 5/4) crushed clay loam; 99% reddish brown (5YR 5/4) crushed moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine roots between peds; many very fine and fine interstitial pores; few distinct (5YR 5/2) patchy clay films (cutans) on faces of peds and in pores; common irregular soft masses of carbonate; violently effervescent (HCl, unspecified); gradual smooth boundary
Btk2b	190-228 cm	99% reddish yellow (5YR 7/6) crushed silty clay loam; 99% reddish yellow (5YR 6/6)crushed moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky, slightly plastic; many very fine and fine roots between peds; many very fine and fine interstitial pores; common distinct (5YR 6/4) continuous clay films (cutans) on faces of peds and in pores; many irregular soft masses of lime; violently effervescent (HCl, unspecified) continuous; gradual smooth boundary
Btk3b	228-269 cm	99% reddish yellow (5YR 5/6) crushed silty clay loam; 99% yellowish red (5YR 5/6) crushed moist; weak coarse prismatic structure; slightly hard, firm, slightly sticky, slightly plastic; many very fine and fine interstitial pores; common distinct (5YR 5/4) continuous clay films (cutans) on faces of peds and in pores; common irregular soft masses of lime; violently effervescent (HCl, unspecified) continuous

Soil survey	# S92-NM-669-012	
Location	NMSU Research Center North of Clovis, NM. Next to experimental sites.	
Classification	fine, montmorillonitic, noncalcareous, thermic Aridic Paleustoll	
Parent materials	eolian from mixed material	
Soil series	Olton clay loam	
Geographically associated soils	Acuff loam	
Diagnostic horizons	0 - 30 cm 18 -274 cm 30 -274 cm	mollic argillic calcic
Described by	Robert A. Hill and Kenneth F. Scheffe (USDA, Soil Conservation Service)	
Date	May 20, 1992	
Description:		
Ap	0 - 17 cm	99% brown to dark brown (7.5YR 4/2) crushed clay loam; 99% dark brown (7.5YR 3/2) crushed moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots throughout; many very fine and fine interstitial pores; abrupt smooth boundary
Bt	17- 30 cm	99% brown to dark brown (7.5YR 4/2) crushed clay; 99% dark brown (7.5YR 3/2) crushed moist; weak coarse prismatic structure parting to strong medium subangular blocky; hard, firm, moderately sticky, moderately plastic; common very fine and fine roots between peds; few very fine and fine interstitial pores; many distinct (7.5YR 3/4) continuous clay films (cutans) on faces of peds and in pores; clear smooth boundary
Btk1	30- 63 cm	99% brown (7.5YR 5/2) crushed clay loam; 99% brown to dark brown (7.5YR 4/2) crushed moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and fine roots between peds; few very fine and fine interstitial pores; many distinct (7/5YR 5/4) continuous clay films (cutans) on faces of peds and in pores; few irregular soft masses of carbonate; strongly effervescent (HCl, unspecified) continuous; clear smooth boundary
Btk2	63-114 cm	99% pink (7.5YR 8/4) crushed clay loam; 99% pink (7.5YR 7/4) crushed moist; moderate medium subangular blocky structure; slightly hard, friable, very sticky, moderately plastic; common very fine and fine roots between peds; many very fine and fine interstitial pores; common distinct (7.5YR 7/6) patchy clay films (cutans) on faces of peds and in pores; common irregular soft masses of carbonate; violently effervescent (HCl, unspecified) continuous; gradual smooth boundary
Btk3	114-165 cm	99% reddish yellow (7.5YR 7/6) crushed clay; 99% reddish yellow (7.5YR 6/6) crushed moist; weak medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; few very fine and fine roots between peds; few very fine and fine interstitial pores; few distinct (7.5YR 6/4) patchy clay films (cutans) on faces of peds and in pores; common angular irregular soft masses of carbonate; violently effervescent (HCl, unspecified) continuous; gradual smooth boundary

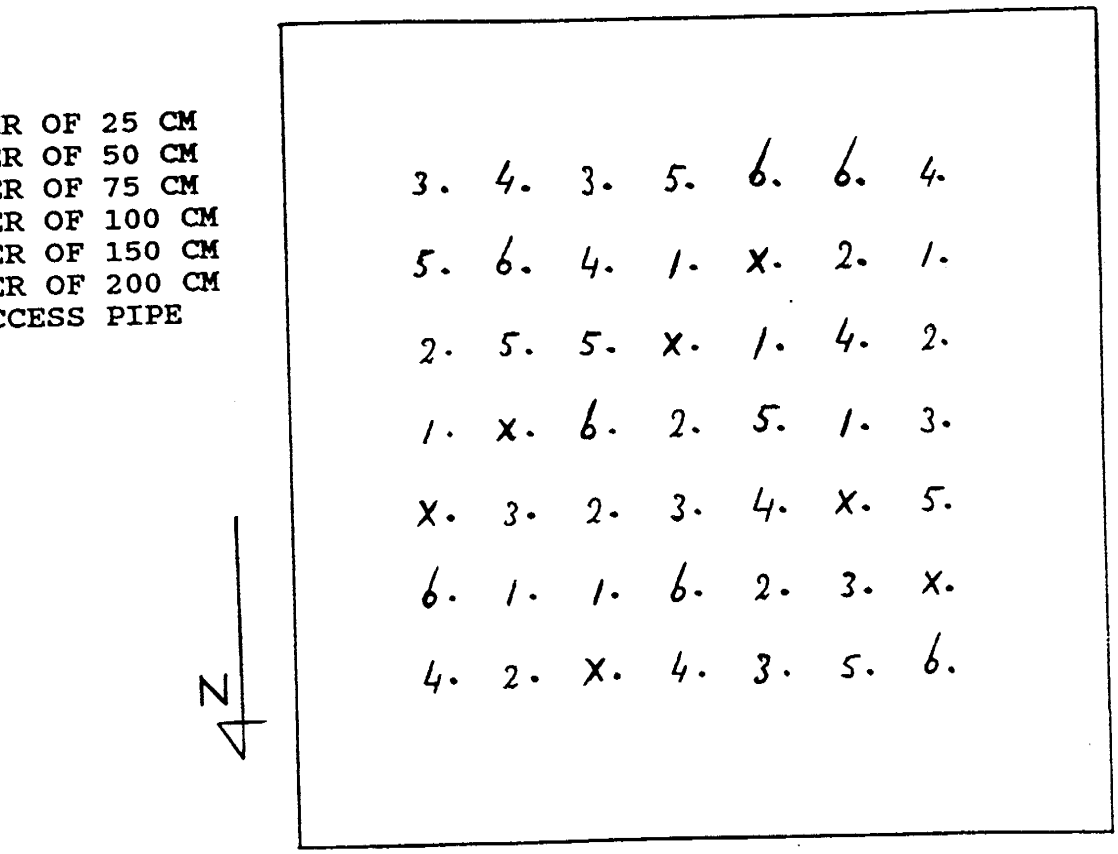
Btk4	165-223 cm	99% pink (5YR 8/4) crushed clay loam; 99% pink (7.5YR 7/4) crushed moist; weak medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; common very fine and fine roots between peds; few very fine and fine interstitial pores; from 185 to 193 centimeters color is 5YR 5/6 and reaction is non effervescent; CaCO3 color is 5YR 8/3; common distinct (5YR 7/0) patchy clay films (cutans) on faces of peds and in pores; many angular irregular soft masses of carbonate; violently effervescent (HCl, unspecified) continuous; gradual smooth boundary
Btk5	223-274 cm	99% yellowish red (5YR 5/6) crushed clay loam; 99% yellowish red (5YR 4/6) crushed moist; weak medium subangular blocky structure; hard, firm, slightly sticky, moderately plastic; few fine interstitial pores; few faint (5YR 4/0) patchy clay films (cutans) on faces of peds and in pores; many angular irregular soft masses of carbonate; violently effervescent (HCl, unspecified) continuous

Appendix B: Design of both experimental plots.

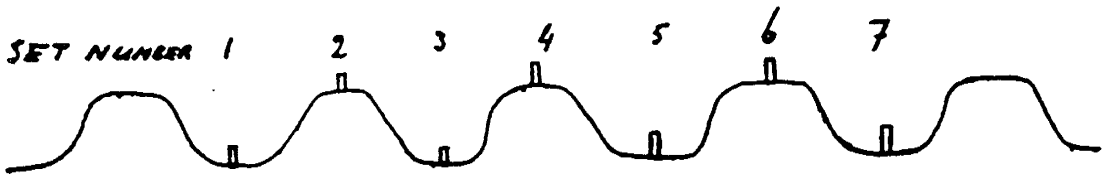
INSTANTANEOUS PROFILE METHOD

TILLAGE PLOT

1 = TENSIOMETER OF 25 CM
2 = TENSIOMETER OF 50 CM
3 = TENSIOMETER OF 75 CM
4 = TENSIOMETER OF 100 CM
5 = TENSIOMETER OF 150 CM
6 = TENSIOMETER OF 200 CM
X = NEUTRON ACCESS PIPE



SIDE VIEW



A TOTAL OF 7 SETS CONSISTING OF 6 TENSIOMETERS AND 1 NEUTRON ACCESS PIPE.

4 SETS PLACED IN THE FURROW, 3 SETS PLACED ON TOP OF THE BED

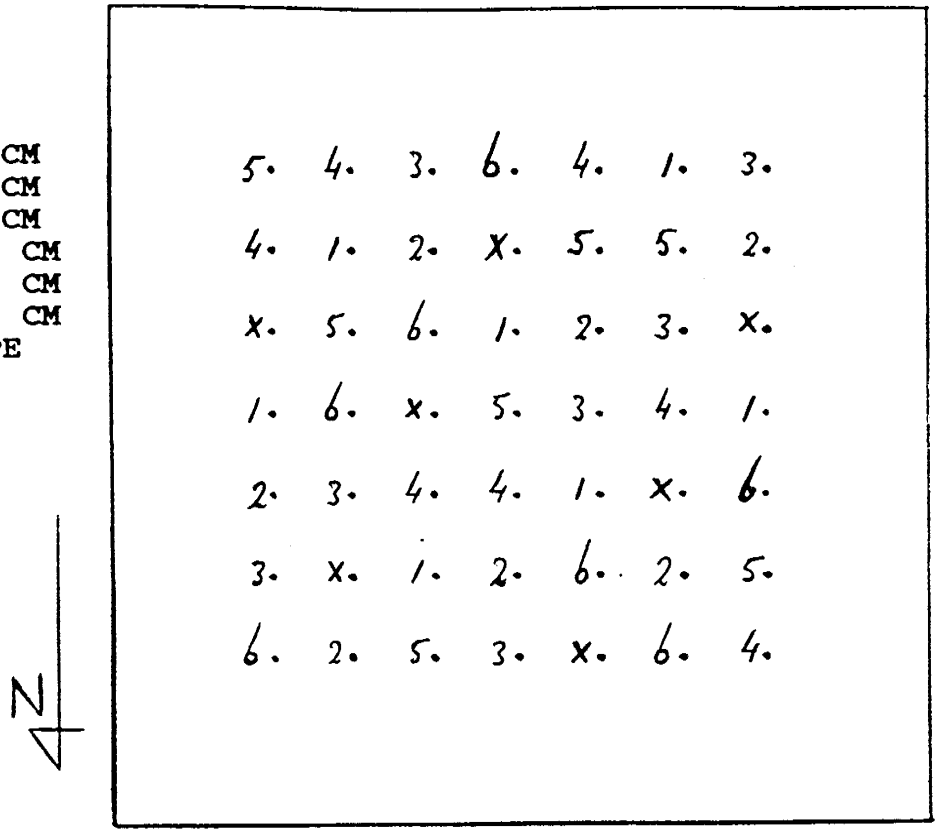
TENSIOMETER MEASUREMENTS ARE TAKEN FROM NORTH TO SOUTH AND NUMBERED FROM 1 TO 6.

NEUTRON READINGS IN THE TILLAGE FIELD AT 8 DEPTHS.

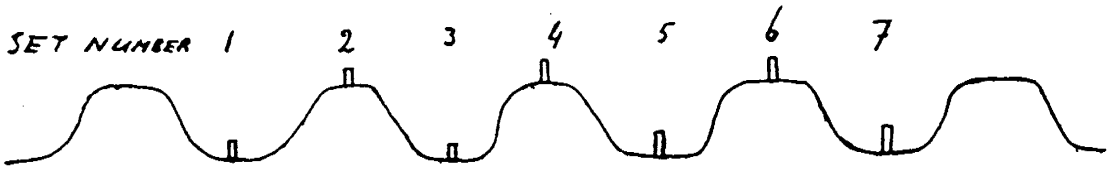
INSTANTANEOUS PROFILE METHOD

NO-TILLAGE PLOT

1 = TENSIOMETER OF 25 CM
2 = TENSIOMETER OF 50 CM
3 = TENSIOMETER OF 75 CM
4 = TENSIOMETER OF 100 CM
5 = TENSIOMETER OF 150 CM
6 = TENSIOMETER OF 200 CM
X = NEUTRON ACCESS PIPE



SIDE VIEW



A TOTAL OF 7 SETS CONSISTING OF 6 TENSIOMETERS AND 1 NEUTRON ACCESS PIPE.

4 SETS PLACED IN THE FURROW, 3 SETS PLACED ON TOP OF THE BED

TENSIOMETER MEASUREMENTS ARE TAKEN FROM NORTH TO SOUTH AND NUMBERED FROM 1 TO 6.

NEUTRON READINGS IN THE NO-TILL FIELD AT **10** DEPTHS.

Appendix C: Calibration of the neutron probe.

CALIBRATION CURVE BASED DATA POINTS.

OBSN	C	W
1	613	0.39
2	628	0.39
3	634	0.36
4	638	0.35
5	490	0.23
6	541	0.29
7	584	0.33
8	585	0.28
9	505	0.25
10	449	0.22
11	473	0.22
12	390	0.20
13	389	0.20
14	404	0.18
15	327	0.18
16	371	0.17
17	367	0.16
18	343	0.16
19	343	0.16
20	371	0.16

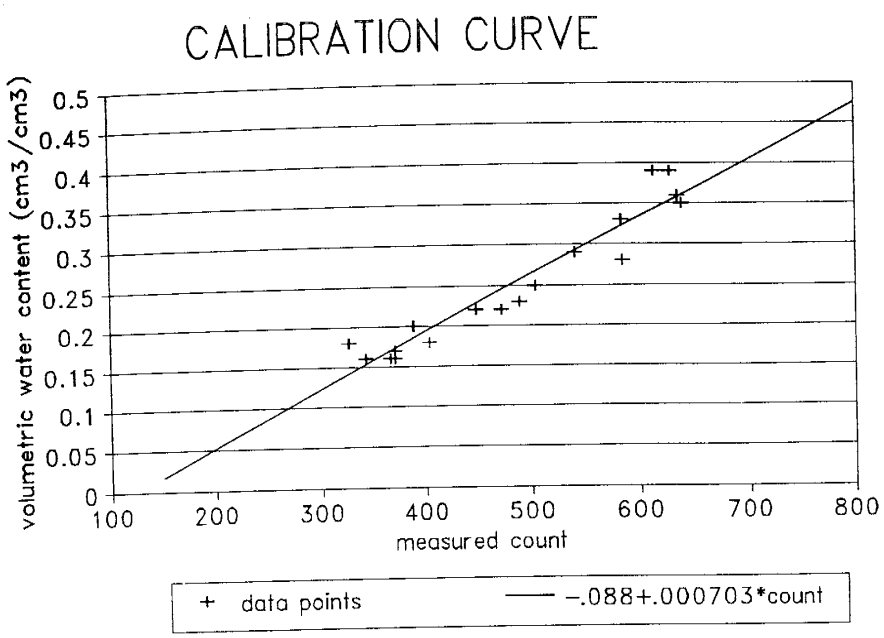
Number of observations in data set = 20

General Linear Models Procedure

R-Square	C.V.	Root MSE	W Mean
0.922381	9.525739	0.023243	0.24400000

Source		F Value	Pr > F
INTERCEPT	-.0878613056 -3.77	0.0014	
C	0.0007027238	14.63	0.0001

Calibration curve of the neutron probe.



Appendix D: Tensiometric data from conventional and no-tillage plot

IPM1 CONVENTIONAL TILLAGE DATA
TENSIOMETER READINGS OF THE INSTANTANEOUS
PROFILE METHOD ON A CONVENTIONAL TILLAGE PLOT.
EXPERIMENT STARTED ON JULY 22,1991
F = TENSIOMETER SET IN THE FURROW
B = TENSIOMETER SET ON THE BED
TENSIOMETERS IN RANDOMIZED ORDER

SETNO. POSITION DATE TIME D100 D200 D25 D50 D150 D75
DATA SET 1
1 F 072291 08.35 370 695 75 195 736 230
1 F 072291 10.57 102 690 38 50 735 88
1 F 072291 11.30 100 687 25 58 732 74
1 F 072291 13.22 107 681 12 54 722 69
1 F 072291 14.55 106 675 22 57 716 76
1 F 072291 18.00 106 680 18 58 692 74
1 F 072391 05.30 106 691 4 53 518 56
1 F 072391 10.20 122 307 12 58 168 73
1 F 072391 14.30 119 270 10 63 169 70
1 F 072391 19.15 119 247 12 61 169 64
1 F 072491 09.45 128 211 23 38 161 67
1 F 072491 15.15 146 221 37 58 169 91
1 F 072591 08.30 165 225 51 102 173 117
1 F 072591 14.45 172 225 65 116 175 132
1 F 072691 08.00 181 230 81 117 189 142
1 F 072691 11.10 107 234 59 41 190 76
1 F 072691 14.45 87 110 36 28 55 60
1 F 072791 10.00 93 223 14 42 162 56
1 F 072891 09.00 114 203 19 35 159 58
1 F 072891 15.00 106 216 21 37 165 57
1 F 072891 18.30 87 206 28 37 128 99
1 F 072991 06.30 115 225 29 39 127 52
1 F 072991 08.40 124 213 42 54 163 67
1 F 072991 09.50 138 212 47 61 164 76
1 F 072991 12.20 140 170 31 69 162 87
1 F 072991 15.35 142 232 51 70 83 99
1 F 072991 19.30 150 225 56 113 193 103
1 F 073091 02.00 176 251 74 120 176 115
1 F 073091 07.45 175 245 83 110 209 142
1 F 073091 11.50 175 254 82 125 214 152
1 F 073091 15.07 178 236 83 130 219 83
1 F 073091 20.20 192 241 90 140 216 177
1 F 073191 06.25 186 269 94 140 221 172
1 F 073191 12.30 193 277 96 140 233 178
1 F 073191 20.30 182 286 . . 233 .
1 F 080191 06.00 . 279 100 144 . .
1 F 080191 19.15 194 279 104 151 240 214
1 F 080291 13.00 206 286 104 158 . .
1 F 080491 13.00 213 310 119 168 237 253
1 F 080591 13.30 216 310 120 174 290 224
1 F 080691 15.30 249 368 131 212 328 294
1 F 080791 12.30 252 368 129 191 294 234
1 F 080891 15.10 253 361 140 218 317 244
1 F 080991 14.40 244 349 121 498 306 242
1 F 081191 12.00 247 327 139 200 . 263
1 F 081291 13.25 262 335 152 208 . 273
1 F 081491 08.50 258 337 149 183 . 240
1 F 081791 10.00 267 344 151 214 . 208
1 F 081991 10.45 293 370 168 235 . 247
1 F 082291 08.15 263 350 182 208 . 251
1 F 082691 07.48 295 381 185 242 . 242
1 F 082991 08.05 307 393 208 255 . 293
1 F 090391 07.57 303 383 185 261 . 282
1 F 090591 08.19 319 345 183 267 . 254
1 F 090991 08.04 250 345 224 275 . 283
1 F 091291 07.57 334 405 166 232 . 272
1 F 091691 07.50 343 416 175 257 . 301
1 F 092091 12.28 349 420 169 274 . 311
1 F 092391 07.56 352 420 205 284 . 315
1 F 092691 09.59 322 423 209 292 . 294
1 F 093091 08.09 374 429 217 309 . 317
1 F 100391 08.00 385 418 229 293 . 317
1 F 100791 12.47 370 435 218 303 . 336
1 F 101191 16.00 382 453 . 326 . 282
1 F 101491 07.46 390 456 270 336 . 372
1 F 101791 07.59 388 450 267 342 . 356
1 F 102191 07.50 397 456 279 347 . 370
1 F 102491 08.03 396 456 281 348 . 382
1 F 102891 07.59 403 459 291 356 . 385
1 F 110191 12.19 405 459 271 365 . 329
1 F 110491 07.55 408 467 301 369 . 380
1 F 110791 12.42 413 474 311 374 . 402
1 F 111191 07.54 421 480 312 382 . 419
1 F 111491 08.00 423 481 313 383 . 403
1 F 111891 12.35 421 477 289 381 . 397
1 F 112791 15.00 110 450 177 344 . 220
1 F 120591 12.30 435 504 248 381 . 350
1 F 121291 12.32 442 486 313 395 . 329
1 F 012292 12.39 424 498 324 412 . 401
;

SETNO. POSITION DATE TIME D50 D25 D75 D150 D200 D100
DATA SET 2
2 B 072291 08.35 188 128 230 761 704 301
2 B 072291 10.57 57 24 86 750 698 93
2 B 072291 11.30 37 18 83 698 694 76
2 B 072291 13.22 19 4 78 466 672 69
2 B 072291 14.55 33 14 79 408 669 55
2 B 072291 18.00 26 14 82 286 677 72
2 B 072391 05.30 15 4 82 177 704 69
2 B 072391 10.20 18 18 83 188 409 65
2 B 072391 14.30 18 19 83 184 330 72
2 B 072391 19.15 15 15 79 184 300 71
2 B 072491 09.45 11 13 67 171 258 58
2 B 072491 15.15 35 39 93 189 247 87
2 B 072591 08.30 59 52 151 199 246 126
2 B 072591 14.45 71 53 156 200 246 133
2 B 072691 08.00 93 61 170 232 257 188
2 B 072691 11.10 35 18 75 238 252 81
2 B 072691 14.45 24 16 74 237 250 89
2 B 072791 10.00 19 18 68 141 238 85
2 B 072891 09.00 9 17 69 172 231 85
2 B 072891 15.00 15 11 51 179 230 67
2 B 072891 18.30 12 16 67 180 208 85
2 B 072991 06.30 20 20 72 184 228 88
2 B 072991 08.40 18 29 79 170 229 99
2 B 072991 09.50 19 34 92 181 237 104
2 B 072991 12.20 38 42 116 175 231 84
2 B 072991 15.35 40 40 79 192 229 44
2 B 072991 19.30 44 52 135 200 238 108
2 B 073091 02.00 45 40 125 212 243 170
2 B 073091 07.45 46 48 138 212 264 146

2 B 073091 11.50 63 63 151 219 260 138
2 B 073091 15.07 72 72 148 232 270 170
2 B 073091 20.20 96 69 . 231 273 .
2 B 073191 06.25 96 72 174 231 282 190
2 B 073191 12.30 104 66 174 235 292 198
2 B 073191 20.30 108 70 177 236 287 .
2 B 080191 06.00 107 69 189 243 283 170
2 B 080191 19.15 122 73 186 238 283 201
2 B 080291 13.00 120 74 191 241 294 196
2 B 080491 13.00 155 99 206 252 346 308
2 B 080591 13.30 148 77 205 256 308 233
2 B 080691 15.30 191 115 246 292 455 344
2 B 080791 12.30 172 110 234 282 412 303
2 B 080891 15.10 181 101 245 295 376 281
2 B 080991 14.40 184 120 244 303 382 312
2 B 081191 12.00 188 110 242 291 404 310
2 B 081291 13.25 199 440 244 283 376 306
2 B 081491 08.50 . 94 240 280 309 285
2 B 081791 10.00 183 91 256 306 343 234
2 B 081991 10.45 204 105 280 341 378 284
2 B 082291 08.15 200 101 284 313 361 266
2 B 082691 07.48 222 114 286 322 361 290
2 B 082991 08.05 229 108 274 345 370 175
2 B 090391 07.57 99 100 304 338 380 291
2 B 090591 08.19 247 102 237 347 300 166
2 B 090991 08.04 207 101 183 359 402 80
2 B 091291 07.57 268 120 318 373 418 343
2 B 091691 07.50 274 125 323 381 431 358
2 B 092091 12.28 272 136 330 388 438 363
2 B 092391 07.56 282 133 336 385 426 357
2 B 092691 09.59 279 125 272 396 416 331
2 B 093091 08.09 297 124 333 396 406 320
2 B 100391 08.00 308 142 333 385 409 361
2 B 100791 12.47 291 128 343 407 437 284
2 B 101191 16.00 196 . 365 430 437 341
2 B 101491 07.46 344 166 362 423 453 397
2 B 101791 07.59 346 163 368 424 447 391
2 B 102191 07.50 351 178 377 430 466 410
2 B 102491 08.03 355 181 378 431 465 412
2 B 102891 07.59 359 184 384 436 474 409
2 B 110191 12.19 347 174 397 451 492 412
2 B 110491 07.55 367 199 398 446 468 416
2 B 110791 12.24 372 199 403 390 482 416
2 B 111191 07.54 378 213 410 457 489 440
2 B 111491 08.00 373 208 409 459 491 440
2 B 111891 12.35 359 197 404 464 479 436
2 B 112791 15.00 185 147 370 338 463 267
2 B 120591 12.30 305 175 409 472 496 435
2 B 121291 12.32 380 203 418 488 480 416
2 B 012292 12.39 354 141 428 486 495 422
;

SETNO. POSITION DATE TIME D25 D50 D200 D150 D100 D75
DATA SET 3
3 F 072291 08.35 152 208 646 800 350 258
3 F 072291 10.57 150 219 640 745 368 125
3 F 072291 11.30 149 216 636 727 357 140
3 F 072291 13.22 60 63 612 652 366 184
3 F 072291 14.55 42 61 601 598 350 115
3 F 072291 18.00 39 58 496 477 214 103
3 F 072391 05.30 25 56 538 423 130 108
3 F 072391 10.20 25 59 252 212 133 117
3 F 072391 14.30 28 59 218 200 139 117
3 F 072391 19.15 28 59 205 209 133 116
3 F 072491 09.45 29 74 237 169 133 103
3 F 072491 15.15 43 83 244 190 147 134
3 F 072591 08.30 52 97 265 224 164 149
3 F 072591 14.45 60 107 264 216 140 156
3 F 072691 08.00 66 99 277 236 150 162
3 F 072691 11.10 25 60 270 230 150 111
3 F 072691 14.45 22 57 272 233 174 136
3 F 072791 10.00 20 64 252 150 138 120
3 F 072891 09.00 7 64 227 198 132 113
3 F 072891 15.00 18 63 234 195 132 112
3 F 072891 18.30 22 66 234 193 131 110
3 F 072991 06.30 24 70 250 196 138 122
3 F 072991 08.40 24 68 247 123 137 112
3 F 072991 09.50 24 76 245 189 128 113
3 F 072991 12.20 47 87 247 168 139 118
3 F 072991 15.35 29 92 248 138 144 117
3 F 072991 19.30 49 99 246 204 156 137
3 F 073091 02.00 48 102 255 225 170 147
3 F 073091 07.45 57 101 258 220 165 153
3 F 073091 11.50 78 116 267 234 183 148
3 F 073091 15.07 87 127 260 248 195 166
3 F 073091 20.20 90 123 275 . . 166
3 F 073191 06.25 93 117 283 239 194 174
3 F 073191 12.30 90 134 283 245 211 179
3 F 073191 20.30 92 125 277 246 203 180
3 F 080191 06.00 . 115 284 . 202 189
3 F 080191 19.15 97 154 286 245 183 184
3 F 080291 13.00 93 153 295 253 199 191
3 F 080491 13.00 101 152 316 267 212 203
3 F 080591 13.30 101 166 312 271 215 207
3 F 080691 15.30 105 196 360 354 270 235
3 F 080791 12.30 111 . 340 278 248 228
3 F 080891 15.10 136 211 360 302 283 242
3 F 080991 14.40 119 178 367 297 264 244
3 F 081191 12.00 133 197 362 296 249 244
3 F 081291 13.25 139 224 361 303 257 238
3 F 081491 08.50 140 181 361 300 257 241
3 F 081791 10.00 121 190 361 319 265 253
3 F 081991 10.45 140 217 384 332 287 269
3 F 082291 08.15 152 205 379 318 274 252
3 F 082691 07.48 171 215 381 334 294 264
3 F 082991 08.05 180 255 386 347 300 284
3 F 090391 07.57 167 212 374 338 284 270
3 F 090591 08.19 146 226 403 193 266 106
3 F 090991 08.04 193 271 398 350 329 302
3 F 091291 07.57 235 289 400 370 322 312
3 F 091691 07.50 252 301 418 384 336 329
3 F 092091 12.28 240 306 431 396 346 340
3 F 092391 07.56 240 309 425 393 348 335
3 F 092691 09.59 220 306 427 406 348 338
3 F 093091 08.09 218 316 428 406 352 343
3 F 100391 08.00 243 302 420 393 344 340
3 F 100791 12.47 220 311 435 415 350 347
3 F 101191 16.00 . 301 456 422 383 378
3 F 101491 07.46 293 328 455 417 390 370
3 F 101791 07.59 276 347 453 425 386 360
3 F 102191 07.50 290 316 464 432 396 383
3 F 102491 08.03 293 356 461 437 402 390
3 F 102891 07.59 301 355 464 439 395 384
3 F 110191 12.19 269 357 468 447 396 381
3 F 110491 07.55 310 367 467 442 404 386
3 F 110791 12.42 302 372 476 444 418 405
3 F 111191 07.54 317 376 483 449 433 418
3 F 111491 08.00 309 374 485 453 429 419
3 F 111891 12.35 302 369 476 458 410 408
3 F 112791 15.00 268 251 471 345 295 283
3 F 120591 12.30 232 352 489 467 439 438
3 F 121291 12.32 275 359 491 170 412 399
3 F 012292 12.39 244 401 514 483 446 415
;

SETNO. POSITION DATE TIME D100 D200 D75 D50 D25 D150
DATA SET 4
4 B 072291 08.35 284 674 207 189 110 808
4 B 072291 10.57 260 665 222 175 96 797
4 B 072291 11.30 222 662 77 39 42 797
4 B 072291 13.22 114 646 34 26 23 789
4 B 072291 14.55 115 624 35 26 23 786
4 B 072291 18.00 124 599 31 25 23 770
4 B 072391 05.30 122 593 21 19 15 177
4 B 072391 10.20 125 476 28 24 17 189
4 B 072391 14.30 126 249 23 23 17 192
4 B 072391 19.15 128 239 24 20 14 175
4 B 072491 09.45 119 273 24 22 8 175
4 B 072491 15.15 146 255 43 44 39 196
4 B 072591 08.30 158 218 139 91 49 198
4 B 072591 14.45 159 230 147 97 55 225
4 B 072691 08.00 186 242 160 108 59 219
4 B 072691 11.10 184 217 58 28 15 143
4 B 072691 14.45 165 210 58 23 16 218
4 B 072791 10.00 130 222 62 25 25 184
4 B 072891 09.00 127 203 58 18 18 184
4 B 072891 15.00 130 223 54 20 23 186
4 B 072891 18.30 127 203 60 21 24 187
4 B 072991 06.30 130 228 57 30 28 184
4 B 072991 08.40 140 230 67 42 37 184
4 B 072991 09.50 138 238 76 42 41 192
4 B 072991 12.20 143 230 104 51 43 194
4 B 072991 15.35 151 223 110 64 30 204
4 B 072991 19.30 141 220 119 87 50 185
4 B 073091 02.00 151 227 131 79 53 191
4 B 073091 07.45 160 235 131 81 54 203
4 B 073091 11.50 168 240 144 87 57 219
4 B 073091 15.07 173 252 146 90 60 213
4 B 073091 20.20 182 256 154 111 60 178
4 B 073191 06.25 193 270 154 112 75 240
4 B 073191 12.30 196 282 158 113 72 244
4 B 073191 20.30 201 266 162 117 77 248
4 B 080191 06.00 190 266 168 121 87 248
4 B 080191 19.15 201 275 172 127 82 250
4 B 080291 13.00 204 277 176 125 74 250
4 B 080491 13.00 231 297 202 122 76 264
4 B 080591 13.30 221 291 190 134 80 268
4 B 080691 15.30 342 384 255 196 99 296
4 B 080791 12.30 214 339 222 138 94 286
4 B 080891 15.10 221 374 252 162 92 289
4 B 080991 14.40 236 396 252 159 108 319
4 B 081191 12.00 239 329 231 173 109 285
4 B 081291 13.25 256 345 239 190 107 276
4 B 081491 08.50 248 334 231 181 107 286
4 B 081791 10.00 261 343 237 174 111 306
4 B 081991 10.45 299 379 261 198 121 341
4 B 082291 08.15 278 343 238 185 115 314
4 B 082691 07.48 273 368 267 203 112 318
4 B 082991 08.05 290 380 282 221 110 344
4 B 090391 07.57 282 361 . 150 68 333
4 B 090591 08.19 267 300 154 102 79 334
4 B 090991 08.04 314 414 303 134 109 328
4 B 091291 07.57 329 390 305 256 136 361
4 B 091691 07.50 354 417 319 283 145 381
4 B 092091 12.28 358 426 321 292 164 390
4 B 092391 07.56 365 414 332 287 142 389
4 B 092691 09.59 368 412 340 276 140 404
4 B 093091 08.09 359 408 348 272 131 404
4 B 100391 08.00 359 417 343 291 144 393
4 B 100791 12.47 364 425 360 275 154 422
4 B 101191 16.00 377 437 339 220 175 425
4 B 101491 07.46 400 460 338 160 167 425
4 B 101791 07.59 402 451 382 330 163 417
4 B 102191 07.50 407 465 388 344 178 433
4 B 102491 08.03 419 179 403 358 166 441
4 B 102891 07.59 423 465 400 352 173 443
4 B 110191 12.19 405 453 400 305 172 463
4 B 110491 07.55 406 464 406 353 193 442
4 B 110791 12.42 421 470 407 366 217 451
4 B 111191 07.54 428 483 412 376 245 461
4 B 111491 08.00 428 486 410 370 240 465
4 B 111891 12.35 421 179 406 369 303 464
4 B 112791 15.00 278 381 313 324 131 403
4 B 120591 12.30 436 486 400 305 215 479
4 B 121291 12.32 444 460 416 333 202 468
4 B 012292 12.39 . 501 435 385 240 471
;

SETNO. POSITION DATE TIME D75 D50 D100 D150 D25 D200
DATA SET 5
5 F 072291 08.35 246 185 363 809 139 792
5 F 072291 10.57 281 40 369 803 41 791
5 F 072291 11.30 271 33 307 799 21 789
5 F 072291 13.22 137 30 312 779 19 775
5 F 072291 14.55 103 34 277 770 19 769
5 F 072291 18.00 103 33 109 655 10 759
5 F 072391 05.30 112 30 125 202 4 419
5 F 072391 10.20 117 35 131 194 12 560
5 F 072391 14.30 116 33 131 192 13 504
5 F 072391 19.15 113 32 132 194 13 470
5 F 072491 09.45 119 29 135 189 14 245
5 F 072491 15.15 124 57 146 200 32 236
5 F 072591 08.30 152 69 162 226 59 252
5 F 072591 14.45 151 104 178 229 69 252
5 F 072691 08.00 164 125 179 219 69 269
5 F 072691 11.10 145 61 165 210 10 251
5 F 072691 14.45 134 56 171 235 8 225
5 F 072791 10.00 106 55 129 194 13 248
5 F 072891 09.00 87 46 123 181 1 220
5 F 072891 15.00 101 43 128 182 11 218
5 F 072891 18.30 86 49 118 194 16 208
5 F 072991 06.30 113 44 120 187 11 216
5 F 072991 08.40 105 51 134 196 32 207
5 F 072991 09.50 103 58 134 196 36 160
5 F 072991 12.20 109 58 131 202 43 168
5 F 072991 15.35 63 55 139 166 38 214
5 F 072991 19.30 112 40 125 181 58 218
5 F 073091 02.00 140 88 166 190 56 247
5 F 073091 07.45 143 95 164 213 49 223
5 F 073091 11.50 164 118 178 226 67 260
5 F 073091 15.07 143 111 176 222 70 248
5 F 073091 20.20 160 120 142 228 76 269
5 F 073191 06.25 155 123 191 243 84 262
5 F 073191 12.30 159 130 190 247 76 265
5 F 073191 20.30 163 127 186 . 81 .
5 F 080191 06.00 164 . . . 93 .
5 F 080191 19.15 167 135 202 251 83 289
5 F 080291 13.00 175 136 203 262 86 280
5 F 080491 13.00 195 149 210 278 70 294
5 F 080591 13.30 199 134 215 272 81 282
5 F 080691 15.30 267 201 224 291 98 357
5 F 080791 12.30 175 171 231 292 102 322
5 F 080891 15.10 230 228 230 300 106 334
5 F 080991 14.40 259 197 250 321 126 359
5 F 081191 12.00 224 190 238 289 129 362
5 F 081291 13.25 236 215 245 295 139 347
5 F 081491 08.50 236 200 244 291 155 337
5 F 081791 10.00 246 193 263 313 143 338
5 F 081991 10.45 267 224 285 327 149 363

5 F 082291 08.15 251 194 276 323 158 342
5 F 082691 07.48 257 225 288 334 178 368
5 F 082991 08.05 276 249 308 354 190 370
5 F 090391 07.57 267 214 285 326 179 270
5 F 090591 08.19 268 232 278 309 173 338
5 F 090991 08.04 261 205 126 326 11 214
5 F 091291 07.57 320 266 324 364 209 393
5 F 091691 07.50 334 295 337 381 224 424
5 F 092091 12.28 342 300 344 387 232 429
5 F 092391 07.56 344 293 352 382 242 408
5 F 092691 09.59 351 289 366 391 245 402
5 F 093091 08.09 355 280 370 392 257 401
5 F 100391 08.00 340 297 376 378 267 411
5 F 100791 12.47 357 284 389 386 256 425
5 F 101191 16.00 366 287 387 424 . 435
5 F 101491 07.46 370 352 397 418 290 439
5 F 101791 07.59 382 344 400 417 290 431
5 F 102191 07.50 384 357 400 430 291 453
5 F 102491 08.03 397 367 410 434 304 450
5 F 102891 07.59 397 361 412 432 306 450
5 F 110191 12.19 401 333 419 417 295 440
5 F 110491 07.55 392 362 408 427 310 446
5 F 110791 12.42 405 383 420 438 309 460
5 F 111191 07.54 413 387 427 450 317 476
5 F 111491 08.00 413 382 427 450 312 477
5 F 111891 12.35 405 396 412 391 310 456
5 F 112791 15.00 375 284 395 388 200 403
5 F 120591 12.30 408 360 440 479 200 478
5 F 121291 12.32 420 367 444 434 300 464
5 F 012292 12.39 408 371 465 485 335 483
;

SETNO. POSITION DATE TIME D150 D75 D25 D100 D50 D200
DATA SET 6
6 B 072291 08.35 . 230 126 288 165 748
6 B 072291 10.57 . 229 125 293 159 740
6 B 072291 11.30 . 69 27 280 74 737
6 B 072291 13.22 . 52 20 38 47 697
6 B 072291 14.55 . 52 22 56 38 681
6 B 072291 18.00 . 48 21 62 31 574
6 B 072391 05.30 . 50 9 99 32 479
6 B 072391 10.20 . 59 17 106 37 283
6 B 072391 14.30 . 65 16 103 35 191
6 B 072391 19.15 . 67 14 96 37 197
6 B 072491 09.45 . 62 18 79 42 234
6 B 072491 15.15 . 88 31 151 63 240
6 B 072591 08.30 . 141 49 169 74 214
6 B 072591 14.45 . 143 45 174 71 177
6 B 072691 08.00 . 154 58 175 94 273
6 B 072691 11.10 . 72 10 56 47 253
6 B 072691 14.45 . 69 11 44 39 256
6 B 072791 10.00 . 69 12 84 45 244
6 B 072891 09.00 . 56 5 . 37 222
6 B 072891 15.00 . 59 9 25 30 219
6 B 072891 18.30 . 63 12 30 33 218
6 B 072991 06.30 . 58 19 38 48 232
6 B 072991 08.40 . 63 28 50 47 137
6 B 072991 09.50 . 65 35 79 65 100
6 B 072991 12.20 . 73 37 126 67 146
6 B 072991 15.35 . 74 32 64 57 128
6 B 072991 19.30 . 109 38 145 46 126
6 B 073091 02.00 . 129 43 153 45 132
6 B 073091 07.45 . 126 48 159 54 185
6 B 073091 11.50 . 149 63 168 64 194
6 B 073091 15.07 . 128 56 168 60 135
6 B 073091 20.20 . . 107 . 68 .
6 B 073191 06.25 . 156 72 185 71 167
6 B 073191 12.30 . 152 60 182 69 182
6 B 073191 20.30 . 157 60 189 73 205
6 B 080191 06.00 . . 76 . 80 210
6 B 080191 19.15 . 166 72 192 79 296
6 B 080291 13.00 . 171 74 199 81 305
6 B 080491 13.00 . 196 73 216 78 346
6 B 080591 13.30 . 185 71 214 84 310
6 B 080691 15.30 . 245 83 265 136 457
6 B 080791 12.30 . 233 85 240 121 309
6 B 080891 15.10 . 222 68 256 106 334
6 B 080991 14.40 . 264 108 294 180 410
6 B 081191 12.00 . 238 117 267 134 349
6 B 081291 13.25 . 258 107 255 138 344
6 B 081491 08.50 . 239 102 249 131 354
6 B 081791 10.00 . 234 102 264 141 339
6 B 081991 10.45 . 259 113 293 165 365
6 B 082291 08.15 . 193 103 252 162 337
6 B 082691 07.48 . 239 99 285 174 354
6 B 082991 08.05 . 153 50 276 90 374
6 B 090391 07.57 . 249 97 289 182 346
6 B 090591 08.19 . 146 98 181 153 169
6 B 090991 08.04 . 105 81 155 201 103
6 B 091291 07.57 . 292 128 330 226 384
6 B 091691 07.50 . 332 139 353 256 433
6 B 092091 12.28 . 339 142 362 267 425
6 B 092391 07.56 . 323 140 362 267 402
6 B 092691 09.59 . 306 140 361 261 338
6 B 093091 08.09 . 289 143 354 258 395
6 B 100391 08.00 . 328 151 368 268 408
6 B 100791 12.47 . 314 153 383 213 .
6 B 101191 16.00 . 263 154 388 248 420
6 B 101491 07.46 . 382 172 385 325 397
6 B 101791 07.59 . 380 168 390 305 434
6 B 102191 07.50 . 374 184 402 339 463
6 B 102491 08.03 . 381 175 409 337 464
6 B 102891 07.59 . 388 124 409 337 459
6 B 110191 12.19 . 386 206 430 320 479
6 B 110491 07.55 . 392 205 415 339 458
6 B 110791 12.42 . 409 215 419 353 469
6 B 111191 07.54 . 411 226 428 369 485
6 B 111491 08.00 . 400 222 427 365 481
6 B 111891 12.35 . 405 212 423 354 484
6 B 112791 15.00 . 303 111 219 213 411
6 B 120591 12.30 . 378 232 440 316 481
6 B 121291 12.32 . 393 190 453 307 458
6 B 012292 12.39 . 423 217 365 362 380
;

SETNO. POSITION DATE TIME D200 D150 D75 D50 D25 D100
DATA SET 7
7 F 072291 08.35 693 827 243 195 129 562
7 F 072291 10.57 697 824 260 94 130 544
7 F 072291 11.30 691 820 260 59 128 534
7 F 072291 13.22 686 807 269 58 105 263
7 F 072291 14.55 685 799 266 54 87 350
7 F 072291 18.00 649 710 163 58 60 314
7 F 072391 05.30 565 462 106 56 39 120
7 F 072391 10.20 452 467 103 57 22 139
7 F 072391 14.30 311 411 113 59 28 142
7 F 072391 19.15 312 346 110 57 21 134
7 F 072491 09.45 647 187 123 73 22 138
7 F 072491 15.15 603 205 131 77 49 150
7 F 072591 08.30 291 217 159 75 63 178
7 F 072591 14.45 214 217 164 82 68 180
7 F 072691 08.00 252 238 164 115 69 181
7 F 072691 11.10 220 218 158 98 34 111
7 F 072691 14.45 210 154 49 65 31 127

7 F 072791 10.00 247 200 109 64 33 85
7 F 072891 09.00 228 194 107 70 30 100
7 F 072891 15.00 221 167 107 35 40 81
7 F 072891 18.30 233 187 11 60 40 134
7 F 072991 06.30 236 203 118 62 43 135
7 F 072991 08.40 232 205 119 76 45 128
7 F 072991 09.50 234 205 111 77 45 136
7 F 072991 12.20 231 198 128 78 30 103
7 F 072991 15.35 180 134 122 66 42 115
7 F 072991 19.30 225 173 135 83 59 153
7 F 073091 02.00 215 185 145 89 62 159
7 F 073091 07.45 237 197 148 94 63 165
7 F 073091 11.50 248 192 154 98 50 178
7 F 073091 15.07 255 226 163 102 69 170
7 F 073091 20.20 . 226 167 105 87 .
7 F 073191 06.25 256 237 171 112 68 191
7 F 073191 12.30 256 236 176 120 74 199
7 F 073191 20.30 267 238 188 122 83 200
7 F 080191 06.00 278 . 194 . . 204
7 F 080191 19.15 284 245 187 130 90 202
7 F 080291 13.00 297 254 194 129 83 209
7 F 080491 13.00 313 268 211 125 89 202
7 F 080591 13.30 301 271 189 141 92 220
7 F 080691 15.30 361 286 225 165 133 238
7 F 080791 12.30 317 293 212 170 113 251
7 F 080891 15.10 299 286 210 182 126 244
7 F 080991 14.40 289 321 229 184 152 286
7 F 081191 12.00 348 298 233 173 123 245
7 F 081291 13.25 361 294 232 194 149 247
7 F 081491 08.50 351 296 235 184 141 247
7 F 081791 10.00 353 312 248 179 120 270
7 F 081991 10.45 383 331 265 201 131 284
7 F 082291 08.15 354 336 269 194 133 268
7 F 082691 07.48 368 334 255 208 152 288
7 F 082991 08.05 392 348 282 227 172 215
7 F 090391 07.57 371 332 264 209 125 297
7 F 090591 08.19 392 339 269 216 120 296
7 F 090991 08.04 408 350 290 263 136 279
7 F 091291 07.57 349 360 302 269 181 329
7 F 091691 07.50 407 377 320 299 216 348
7 F 092091 12.28 415 383 325 302 191 354
7 F 092391 07.56 417 382 319 303 195 352
7 F 092691 09.59 431 394 313 286 187 361
7 F 093091 08.09 432 397 330 306 190 366
7 F 100391 08.00 428 381 326 242 220 353
7 F 100791 12.47 431 381 331 301 209 353
7 F 101191 16.00 442 416 381 248 . 398
7 F 101491 07.46 455 406 360 339 265 375
7 F 101791 07.59 442 413 342 336 241 373
7 F 102191 07.50 461 421 376 337 261 400
7 F 102491 08.03 467 431 378 346 264 391
7 F 102891 07.59 457 432 373 359 259 402
7 F 110191 12.19 481 450 386 352 366 394
7 F 110491 07.55 469 438 383 364 259 407
7 F 110791 12.42 472 442 395 366 284 420
7 F 111191 07.54 481 450 411 374 302 428
7 F 111491 08.00 481 449 409 368 293 433
7 F 111891 12.35 482 448 389 358 269 439
7 F 112791 15.00 479 167 286 239 275 315
7 F 120591 12.30 493 467 417 333 196 447
7 F 121291 12.32 501 471 374 377 269 469
7 F 012292 12.39 498 477 438 404 271 433

IPM2 NO TILLAGE DATA
TENSIOMETER READINGS OF THE INSTANTANEOUS
PROFILE METHOD ON A NO TILLAGE PLOT. EXPERIMENT
STARTED ON AUGUST 9,1991
F = TENSIOMETER SET IN THE FURROW
B = TENSIOMETER SET ON THE BED
TENSIOMETERS IN RANDOMIZED ORDER

SETNO. POSITION DATE TIME D200 D75 D50 D25 D100 D150

DATA SET 1
1 F 080791 11.00 685 454 108 128 595 616
1 F 080991 08.30 745 563 272 80 600 605
1 F 080991 10.00 747 80 36 15 110 592
1 F 080991 10.50 741 80 24 7 110 574
1 F 080991 13.10 729 62 30 12 116 559
1 F 080991 16.00 724 63 30 9 119 532
1 F 080991 19.55 697 69 32 16 145 529
1 F 081091 05.30 717 74 31 17 144 542
1 F 081091 12.40 700 75 25 27 132 496
1 F 081091 20.00 720 79 26 17 132 425
1 F 081191 06.30 724 71 27 21 129 454
1 F 081191 15.15 668 70 25 28 132 408
1 F 081191 19.15 693 60 28 29 126 309
1 F 081291 06.15 727 71 23 28 127 304
1 F 081291 12.15 708 72 26 30 125 257
1 F 081291 19.00 693 71 24 21 126 225
1 F 081391 08.30 557 . . 109 224
1 F 081391 15.30 433 84 28 40 121 234
1 F 081491 07.30 339 82 29 26 125 199
1 F 081491 12.30 329 79 28 19 122 199
1 F 081591 09.52 284 88 35 22 128 178
1 F 081691 07.58 275 97 40 38 143 186
1 F 081791 07.15 276 83 32 30 140 196
1 F 081891 08.30 280 94 33 33 137 201
1 F 081891 12.30 260 88 62 69 135 196
1 F 081891 14.30 273 99 37 48 146 199
1 F 081891 19.00 225 139 46 41 99 265
1 F 081991 09.00 283 109 50 29 166 200
1 F 081991 13.00 277 118 54 32 165 200
1 F 082091 08.25 276 137 63 27 164 208
1 F 082091 14.27 282 127 45 33 163 192
1 F 082191 08.13 287 147 49 51 184 234
1 F 082191 14.37 296 156 74 53 194 241
1 F 082291 09.48 300 171 88 36 196 225
1 F 082291 14.30 305 175 94 51 221 260
1 F 082391 07.55 309 189 107 88 220 262
1 F 082391 14.33 319 193 104 59 233 270
1 F 082691 08.20 311 200 107 83 217 276
1 F 082791 07.55 329 215 128 88 180 221
1 F 082891 07.55 337 225 146 117 248 250
1 F 082991 09.29 345 231 137 91 268 222
1 F 083091 07.55 324 234 152 111 261 282
1 F 090391 09.30 329 253 151 91 286 179
1 F 090491 07.49 338 258 81 102 193 134
1 F 090591 09.50 343 260 58 . 285 304
1 F 090691 14.16 373 287 181 127 320 363
1 F 090991 09.38 367 274 176 120 317 343
1 F 091191 14.43 375 298 205 142 332 365
1 F 091291 09.37 378 296 202 140 332 358
1 F 091391 08.09 378 300 212 148 334 366
1 F 091691 09.25 382 309 227 158 342 380
1 F 091791 10.40 385 310 216 144 345 362
1 F 091891 07.55 387 314 229 157 357 383
1 F 092091 13.30 354 294 215 137 333 353
1 F 092391 09.21 370 302 207 108 342 350
1 F 092591 07.53 374 313 236 133 351 367

1 F 092791 08.17 383 322 246 148 360 376
1 F 093091 09.57 386 324 232 133 364 360
1 F 100291 07.47 394 335 258 156 372 390
1 F 100491 07.40 393 334 260 151 371 382
1 F 100791 13.15 383 345 240 128 381 385
1 F 101191 16.00 426 369 404 381
1 F 101491 08.37 414 362 290 198 390 417
1 F 101791 09.26 416 363 264 171 389 401
1 F 102191 09.28 423 365 278 165 376 409
1 F 102491 09.46 431 375 301 197 407 425
1 F 102891 09.42 436 380 307 202 413 427
1 F 110191 12.56 438 381 303 172 409 434
1 F 110491 09.51 438 389 303 189 414 427
1 F 110791 13.26 444 399 314 226 431 451
1 F 111191 14.30 447 402 344 238 434 451
1 F 111491 09.40 447 402 337 230 433 447
1 F 111891 13.51 454 409 333 222 441 449
1 F 112791 15.40 211 381 168 157 376 412
1 F 120591 13.02 463 413 277 143 446 442
1 F 121291 13.50 468 422 263 224 407 403
1 F 012292 14.34 267 162 54 119 127 370

SETNO. POSITION DATE TIME D50 D75 D200 D150 D25 D100

DATA SET 2
2 B 080791 11.00 276 310 755 123 434
2 B 080991 08.30 246 314 759 155 443
2 B 080991 10.00 138 326 754 438 184 444
2 B 080991 10.50 198 28 739 447 11 104
2 B 080991 13.10 22 22 553 504 17 109
2 B 080991 16.00 20 24 553 538 19 117
2 B 080991 19.55 22 26 601 577 20 129
2 B 081091 05.30 29 30 618 597 21 121
2 B 081091 12.40 21 29 597 552 20 115
2 B 081091 20.00 31 29 616 393 22 119
2 B 081191 06.30 24 30 561 291 22 121
2 B 081191 15.15 10 29 529 230 21 117
2 B 081191 19.15 27 30 493 221 21 121
2 B 081291 06.15 22 21 420 206 17 129
2 B 081291 12.15 23 25 390 206 20 123
2 B 081291 19.00 17 18 333 179 13 132
2 B 081391 08.30 20 26 329 212 15 132
2 B 081391 15.30 23 31 322 221 20 136
2 B 081491 07.30 23 25 285 207 21 135
2 B 081491 12.30 18 29 276 206 22 132
2 B 081591 09.52 18 28 275 186 27 147
2 B 081691 07.58 22 32 280 209 28 149
2 B 081791 07.15 21 27 276 209 23 136
2 B 081891 08.30 21 23 277 217 23 136
2 B 081891 12.30 18 20 275 207 26 140
2 B 081891 14.30 19 32 277 212 30 146
2 B 081891 19.00 22 35 279 217 31 140
2 B 081991 09.00 40 45 269 204 44 160
2 B 081991 13.00 40 47 275 209 47 157
2 B 082091 08.25 28 24 265 190 43 154
2 B 082091 14.27 48 67 283 211 48 149
2 B 082191 08.13 51 113 264 233 55 173
2 B 082191 14.37 60 121 294 243 64 179
2 B 082291 09.48 63 118 307 264 83 197
2 B 082291 14.30 65 127 312 267 73 205
2 B 082391 07.55 84 139 316 273 83 211
2 B 082391 14.33 81 148 325 283 86 218
2 B 082691 08.20 54 144 314 283 78 237
2 B 082791 07.55 80 165 345 299 81 230
2 B 082891 07.55 90 173 355 315 80 263
2 B 082991 09.29 91 176 354 320 88 267
2 B 083091 07.55 99 156 343 311 95 255
2 B 090391 09.30 70 176 363 320 106 286
2 B 090491 07.49 71 208 372 225 91 296
2 B 090591 09.50 127 182 369 342 97 283
2 B 090691 14.16 145 244 322 364 100 225
2 B 090991 09.38 172 229 384 356 122 318
2 B 091191 14.43 175 252 398 386 127 342
2 B 091291 09.37 182 239 372 373 121 334
2 B 091391 08.09 184 240 377 374 116 335
2 B 091691 09.25 204 255 386 385 122 345
2 B 091791 10.40 190 247 390 386 125 349
2 B 091891 07.55 207 258 392 391 125 352
2 B 092091 13.30 82 253 385 355 133 336
2 B 092391 09.21 202 250 392 369 131 344
2 B 092591 07.53 214 266 399 379 130 353
2 B 092791 08.17 220 276 408 394 137 363
2 B 093091 09.57 199 272 408 385 135 364
2 B 100291 07.47 91 292 418 403 136 376
2 B 100491 07.40 247 296 420 414 129 368
2 B 100791 13.15 220 306 433 423 140 383
2 B 101191 16.00 314 446 430 149 394
2 B 101491 08.37 268 318 431 417 153 390
2 B 101791 09.26 246 302 433 416 153 395
2 B 102191 09.28 252 312 441 413 149 400
2 B 102491 09.46 280 334 445 437 150 412
2 B 102891 09.42 276 337 454 443 176 417
2 B 110191 12.56 280 354 456 457 196 440
2 B 110491 09.51 293 346 456 446 189 424
2 B 110791 13.26 317 369 464 456 492 437
2 B 111191 14.30 315 375 466 459 190 438
2 B 111491 09.40 301 368 462 454 182 434
2 B 111891 13.51 301 378 486 454 189 452
2 B 112791 15.40 137 346 444 209 141 394
2 B 120591 13.02 216 377 476 468 186 446
2 B 121291 13.50 322 400 485 484 195 452
2 B 012292 14.34 287 351 423 336 110 349

SETNO. POSITION DATE TIME D150 D25 D100 D200 D50 D75

DATA SET 3
3 F 080791 11.00 190 478 259 359
3 F 080991 08.30 170 481 585 244 379
3 F 080991 10.00 393 24 195 585 10 25
3 F 080991 10.50 410 32 145 579 6 20
3 F 080991 13.10 455 14 169 576 11 18
3 F 080991 16.00 487 24 179 575 14 19
3 F 080991 19.55 521 14 253 590 13 19
3 F 081091 05.30 562 19 261 603 16 19
3 F 081091 12.40 565 28 232 593 20 19
3 F 081091 20.00 572 21 122 436 19 20
3 F 081191 06.30 573 33 172 319 21 19
3 F 081191 15.15 510 30 148 525 20 19
3 F 081191 19.15 496 32 136 427 20 18
3 F 081291 06.15 417 34 137 552 18 18
3 F 081291 12.15 344 37 139 518 17 19
3 F 081291 19.00 298 32 124 473 17 18
3 F 081391 08.30 254 25 133 435
3 F 081391 15.30 240 42 130 382 19 19
3 F 081491 07.30 223 40 137 288 22 20
3 F 081491 12.30 220 31 138 269 19 18
3 F 081591 09.52 217 34 143 243 25 17
3 F 081691 07.58 215 45 148 265 26 26
3 F 081791 07.15 215 34 144 260 26 24
3 F 081891 08.30 218 29 149 260 26 28
3 F 081891 12.30 209 35 137 255 28 29
3 F 081891 14.30 217 39 138 198 27 23

3 F 081891 19.00 220 40 149 280 32 26
3 F 081991 09.00 234 31 157 253 45 65
3 F 081991 13.00 213 36 161 264 47 74
3 F 082091 08.25 186 24 159 248 84 121
3 F 082091 14.27 214 30 157 264 87 124
3 F 082191 08.13 213 50 158 277 84 118
3 F 082191 14.37 235 65 182 281 94 122
3 F 082291 09.48 240 61 198 275 97 123
3 F 082291 14.30 257 69 207 301 109 111
3 F 082391 07.55 259 93 210 314 122 182
3 F 082391 14.33 266 79 219 307 112 141
3 F 082691 08.20 255 78 215 312 114 205
3 F 082791 07.55 270 78 232 334 147 213
3 F 082891 07.55 282 109 239 335 134 190
3 F 082991 09.29 147 98 238 336 143 202
3 F 083091 07.55 299 125 248 349 149 221
3 F 090391 09.30 181 . 212 339 133 99
3 F 090491 07.49 234 81 227 259 150 69
3 F 090591 09.50 304 90 282 186 126 75
3 F 090691 14.16 325 105 303 363 176 246
3 F 090991 09.38 322 164 313 374 201 276
3 F 091191 14.43 332 151 333 418 218 284
3 F 091291 09.37 327 165 327 388 217 294
3 F 091391 08.09 333 173 331 393 221 303
3 F 091691 09.25 343 186 343 404 235 324
3 F 091791 10.40 342 171 344 391 224 302
3 F 091891 07.55 347 187 350 402 217 329
3 F 092091 13.30 343 167 325 368 226 292
3 F 092391 09.21 346 151 336 360 225 278
3 F 092591 07.53 357 173 347 384 235 307
3 F 092791 08.17 366 182 356 394 248 318
3 F 093091 09.57 372 167 363 389 222 301
3 F 100291 07.47 380 168 370 405 262 343
3 F 100491 07.40 361 163 373 415 264 322
3 F 100791 13.15 385 157 494 405 241 304
3 F 101191 16.00 404 134 394 385 . .
3 F 101491 08.37 382 214 384 434 291 365
3 F 101791 09.26 404 199 394 431 285 355
3 F 102191 09.28 410 204 394 432 283 365
3 F 102491 09.46 412 233 401 433 300 390
3 F 102891 09.42 419 227 409 443 611 392
3 F 110191 12.56 426 223 414 434 282 361
3 F 110491 09.51 427 234 414 427 308 375
3 F 110791 13.26 433 263 421 446 343 419
3 F 111191 14.30 438 262 426 452 345 416
3 F 111491 09.40 431 254 422 448 334 403
3 F 111891 13.51 438 256 430 452 333 402
3 F 112791 15.40 264 108 257 432 312 339
3 F 120591 13.02 450 180 441 460 289 309
3 F 121291 13.50 459 228 450 474 339 394
3 F 012292 14.34 392 202 380 425 277 318
;

SETNO. POSITION DATE TIME D75 D50 D100 D150 D25 D200

DATA SET 4
4 B 080791 11.00 265 244 390 . 435 534
4 B 080991 08.30 280 248 415 . 340 516
4 B 080991 10.00 278 236 402 311 327 520
4 B 080991 10.50 61 156 378 307 34 500
4 B 080991 13.10 55 28 99 346 17 524
4 B 080991 16.00 51 21 109 373 20 519
4 B 080991 19.55 39 18 110 741 15 520
4 B 081091 05.30 57 17 118 444 21 540
4 B 081091 12.40 57 13 124 431 15 469
4 B 081091 20.00 61 17 125 420 15 450
4 B 081191 06.30 56 10 120 344 15 472
4 B 081191 15.15 52 18 125 269 16 443
4 B 081191 19.15 51 17 129 259 12 372
4 B 081291 06.15 50 13 134 229 15 336
4 B 081291 12.15 50 15 137 221 15 304
4 B 081291 19.00 48 13 119 230 12 290
4 B 081391 08.30 32 . 100 219 . 263
4 B 081391 15.30 58 19 131 211 20 274
4 B 081491 07.30 54 17 123 213 19 263
4 B 081491 12.30 53 14 115 203 18 251
4 B 081591 09.52 45 12 141 190 21 258
4 B 081691 07.58 63 18 122 198 27 271
4 B 081791 07.15 59 15 133 199 20 264
4 B 081891 08.30 60 16 138 199 21 264
4 B 081891 12.30 65 21 125 198 25 257
4 B 081891 14.30 66 24 133 209 30 272
4 B 081891 19.00 70 23 141 207 28 272
4 B 081991 09.00 75 44 152 201 41 257
4 B 081991 13.00 79 45 164 205 49 280
4 B 082091 08.25 59 29 166 201 23 281
4 B 082091 14.27 78 49 158 219 32 271
4 B 082191 08.13 108 62 172 226 52 299
4 B 082191 14.37 116 69 184 245 67 305
4 B 082291 09.48 122 72 197 256 76 325
4 B 082291 14.30 132 73 210 265 74 319
4 B 082391 07.55 130 100 215 269 84 313
4 B 082391 14.33 130 80 214 275 85 327
4 B 082691 08.20 153 100 223 286 75 324
4 B 082791 07.55 166 119 237 296 84 347
4 B 082891 07.55 149 84 264 314 90 330
4 B 082991 09.29 98 85 115 130 97 326
4 B 083091 07.55 171 130 255 212 99 357
4 B 090391 09.30 193 107 272 248 90 282
4 B 090491 07.49 88 163 284 148 99 220
4 B 090591 09.50 89 100 190 174 98 367
4 B 090691 14.16 240 111 309 283 104 301
4 B 090991 09.38 244 185 305 352 125 403
4 B 091191 14.43 268 186 339 387 126 457
4 B 091291 09.37 255 194 321 371 121 392
4 B 091391 08.09 265 203 320 372 121 392
4 B 091691 09.25 284 225 370 383 128 400
4 B 091791 10.40 264 206 337 378 126 413
4 B 091891 07.55 292 229 341 390 124 406
4 B 092091 13.30 255 204 324 363 129 394
4 B 092391 09.21 245 190 332 361 128 401
4 B 092591 07.53 268 219 343 378 130 405
4 B 092791 08.17 279 235 354 391 134 422
4 B 093091 09.57 262 206 355 372 130 421
4 B 100291 07.47 296 248 365 399 140 423
4 B 100491 07.40 297 252 369 407 124 417
4 B 100791 13.15 272 211 370 389 141 434
4 B 101191 16.00 . . 382 394 120 449
4 B 101491 08.37 339 287 375 422 162 439
4 B 101791 09.26 321 260 384 409 152 439
4 B 102191 09.28 330 269 394 405 162 445
4 B 102491 09.46 344 292 401 427 166 458
4 B 102891 09.42 349 289 409 433 168 465
4 B 110191 12.56 325 263 421 425 174 480
4 B 110491 09.51 345 287 417 434 181 457
4 B 110791 13.26 381 326 431 436 492 477
4 B 111191 14.30 382 326 435 458 189 480
4 B 111491 09.40 366 311 428 448 181 472
4 B 111891 13.51 364 302 433 456 183 488
4 B 112791 15.40 324 70 410 328 104 411
4 B 120591 13.02 260 178 422 439 145 479
4 B 121291 13.50 351 257 439 446 181 503
4 B 012292 14.34 268 194 352 397 109 437

SETNO. POSITION DATE TIME D200 D25 D75 D50 D150 D100

DATA SET 5

5 F 080791 11.00 507 154 315 257 413 370
5 F 080991 08.30 487 125 301 250 399 380
5 F 080991 10.00 482 5 60 30 411 289
5 F 080991 10.50 459 3 58 20 411 230
5 F 080991 13.10 474 30 61 10 413 249
5 F 080991 16.00 494 8 64 31 418 225
5 F 080991 19.55 511 9 64 24 340 260
5 F 081091 05.30 505 9 65 24 425 129
5 F 081091 12.40 484 9 68 23 406 128
5 F 081091 20.00 497 7 67 23 360 124
5 F 081191 06.30 455 8 65 19 255 122
5 F 081191 15.15 365 5 62 23 227 122
5 F 081191 19.15 344 9 65 23 219 120
5 F 081291 06.15 301 6 62 22 209 119
5 F 081291 12.15 282 5 63 22 208 120
5 F 081291 19.00 278 5 53 13 204 111
5 F 081391 08.30 274 . 60 . 214 102
5 F 081391 15.30 293 7 67 23 216 122
5 F 081491 07.30 276 7 66 23 213 120
5 F 081491 12.30 270 25 65 22 214 119
5 F 081591 09.52 246 8 71 28 199 115
5 F 081691 07.58 241 15 77 27 205 125
5 F 081791 07.15 245 5 68 22 198 125
5 F 081891 08.30 255 5 68 27 186 124
5 F 081891 12.30 252 10 72 35 192 123
5 F 081891 14.30 261 13 81 36 200 132
5 F 081891 19.00 261 13 81 42 203 137
5 F 081991 09.00 275 26 82 34 216 152
5 F 081991 13.00 254 38 41 41 225 147
5 F 082091 08.25 240 28 129 40 194 138
5 F 082091 14.27 257 30 132 62 215 147
5 F 082191 08.13 264 38 126 61 235 165
5 F 082191 14.37 280 44 144 74 248 182
5 F 082291 09.48 286 60 162 88 254 193
5 F 082291 14.30 300 67 174 105 276 205
5 F 082391 07.55 302 90 174 120 273 207
5 F 082391 14.33 311 67 178 110 283 214
5 F 082691 08.20 305 88 195 118 248 198
5 F 082791 07.55 321 94 196 128 297 228
5 F 082891 07.55 333 115 207 124 298 238
5 F 082991 09.29 310 16 196 64 293 243
5 F 083091 07.55 312 58 192 147 292 211
5 F 090391 09.30 312 91 202 148 306 251
5 F 090491 07.49 338 76 193 190 153 262
5 F 090591 09.50 262 75 216 138 280 250
5 F 090691 14.16 213 97 244 194 243 310
5 F 090991 09.38 360 144 256 202 344 309
5 F 091191 14.43 390 142 263 230 357 316
5 F 091291 09.37 367 146 269 214 359 326
5 F 091391 08.09 374 150 273 221 366 322
5 F 091691 09.25 386 161 286 238 373 344
5 F 091791 10.40 382 154 284 226 375 344
5 F 091891 07.55 394 164 291 245 382 350
5 F 092091 13.30 389 158 284 230 370 280
5 F 092391 09.21 384 158 285 234 368 341
5 F 092591 07.53 392 170 292 252 372 354
5 F 092791 08.17 405 174 312 260 385 365
5 F 093091 09.57 389 168 295 254 381 354
5 F 100291 07.47 412 180 318 275 394 374
5 F 100491 07.40 419 152 320 281 400 369
5 F 100791 13.15 409 165 313 253 401 380
5 F 101191 16.00 416 102 319 . 416 391
5 F 101491 08.37 427 206 350 314 414 388
5 F 101791 09.26 411 196 326 300 391 372
5 F 102191 09.28 428 200 346 305 406 381
5 F 102491 09.46 437 212 359 315 421 400
5 F 102891 09.42 439 219 359 325 426 399
5 F 110191 12.56 423 214 346 315 413 398
5 F 110491 09.51 436 219 357 333 411 393
5 F 110791 13.26 457 237 391 354 438 431
5 F 111191 14.30 460 241 397 352 441 432
5 F 111491 09.40 451 227 388 336 437 422
5 F 111891 13.51 457 192 381 296 443 431
5 F 112791 15.40 306 86 123 163 219 275
5 F 120591 13.02 446 129 342 257 450 428
5 F 121291 13.50 441 165 349 320 448 434
5 F 012292 14.34 412 125 231 191 378 350

SETNO. POSITION DATE TIME D200 D50 D100 D75 D150 D25

DATA SET 6

6 B 080791 11.00 460 219 334 275 404 159
6 B 080991 08.30 444 247 343 294 404 178
6 B 080991 10.00 433 228 346 290 407 148
6 B 080991 10.50 178 2 95 35 387 22
6 B 080991 13.10 324 19 98 32 407 23
6 B 080991 16.00 363 17 97 28 408 23
6 B 080991 19.55 356 17 98 30 427 22
6 B 081091 05.30 405 18 91 37 308 23
6 B 081091 12.40 . 92 37 229 24
6 B 081091 20.00 405 14 90 38 202 25
6 B 081191 06.30 356 11 89 40 195 21
6 B 081191 15.15 323 13 89 40 194 23
6 B 081191 19.15 309 14 89 40 191 24
6 B 081291 06.15 281 11 87 38 192 22
6 B 081291 12.15 271 15 88 39 185 22
6 B 081291 19.00 272 13 87 37 191 25
6 B 081391 08.30 271 . 82 . 187 .
6 B 081391 15.30 270 20 91 37 190 22
6 B 081491 07.30 254 17 90 36 191 25
6 B 081491 12.30 253 14 89 35 189 20
6 B 081591 09.52 237 21 96 40 177 30
6 B 081691 07.58 244 28 146 40 190 29
6 B 081791 07.15 240 12 92 40 186 26
6 B 081891 08.30 245 15 90 39 189 25
6 B 081891 12.30 241 22 129 45 189 34
6 B 081891 14.30 246 29 139 51 192 42
6 B 081891 19.00 246 29 132 40 192 37
6 B 081991 09.00 268 47 151 87 205 48
6 B 081991 13.00 257 48 161 117 209 48
6 B 082091 08.25 231 27 119 85 196 63
6 B 082091 14.27 252 26 136 104 208 51
6 B 082191 08.13 232 48 146 115 220 53
6 B 082191 14.37 276 72 176 127 237 76
6 B 082291 09.48 296 79 194 147 248 83
6 B 082291 14.30 304 82 206 158 270 83
6 B 082391 07.55 308 91 201 160 265 88
6 B 082391 14.33 309 80 214 161 280 89
6 B 082691 08.20 312 93 234 169 263 88
6 B 082791 07.55 314 90 219 171 292 84
6 B 082891 07.55 326 110 246 193 309 90
6 B 082991 09.29 343 102 251 191 295 100
6 B 083091 07.55 326 108 298 82 250 58
6 B 090391 09.30 352 107 249 88 332 114
6 B 090491 07.49 364 63 261 218 340 87
6 B 090591 09.50 363 125 301 197 358 94
6 B 090691 14.16 279 148 295 229 378 107
6 B 090991 09.38 378 180 304 243 364 131
6 B 091191 14.43 421 206 319 294 404 127
6 B 091291 09.37 396 187 317 267 392 126

6 B 091391 08.09 393 193 318 264 386 127
6 B 091691 09.25 406 202 229 278 393 130
6 B 091791 10.40 403 204 340 278 401 134
6 B 091891 07.55 413 211 336 285 411 130
6 B 092091 13.30 388 207 316 279 401 136
6 B 092391 09.21 383 187 323 266 396 134
6 B 092591 07.53 393 203 329 278 398 135
6 B 092791 08.17 404 215 345 293 . 139
6 B 093091 09.57 405 201 349 278 . 140
6 B 100291 07.47 417 230 355 304 . 142
6 B 100491 07.40 401 232 358 316 . 136
6 B 100791 13.15 258 247 367 302 . 149
6 B 101191 16.00 412 . 389 273 158
6 B 101491 08.37 423 269 376 330 . 157
6 B 101791 09.26 410 351 365 304 . 153
6 B 102191 09.28 431 259 381 318 . 160
6 B 102491 09.46 439 280 393 337 . 174
6 B 102891 09.42 447 297 414 355 . 190
6 B 110191 12.56 465 266 425 369 . 249
6 B 110491 09.51 450 281 419 346 . 186
6 B 110791 13.26 478 333 430 391 . 203
6 B 111191 14.30 472 329 423 387 199
6 B 111491 09.40 460 311 422 377 . 191
6 B 111891 13.51 462 307 430 379 . 207
6 B 112791 15.40 374 110 200 346 . 121
6 B 120591 13.02 457 173 411 344 191
6 B 121291 13.50 472 240 437 381 250
6 B 012292 14.34 415 87 288 226 . 102

SETNO. POSITION DATE TIME D100 D150 D200 D25 D50 D75

DATA SET 7
7 F 080791 11.00 334 . 435 209 257 315
7 F 080991 08.30 339 . 437 201 276 323
7 F 080991 10.00 295 297 429 18 48 58
7 F 080991 10.50 303 315 423 18 45 43
7 F 080991 13.10 310 330 439 28 46 51
7 F 080991 16.00 330 337 431 26 45 49
7 F 080991 19.55 320 365 454 27 45 50
7 F 081091 05.30 131 383 447 21 48 54
7 F 081091 12.40 123 350 434 20 52 53
7 F 081091 20.00 120 279 442 21 52 57
7 F 081191 06.30 119 228 389 23 50 56
7 F 081191 15.15 122 221 299 32 52 56
7 F 081191 19.15 124 218 278 29 53 53
7 F 081291 06.15 119 212 252 30 49 51
7 F 081291 12.15 120 204 245 33 48 52
7 F 081291 19.00 117 208 246 39 48 49
7 F 081391 08.30 102 210 261 . . .
7 F 081391 15.30 124 219 266 41 49 52
7 F 081491 07.30 121 211 260 31 51 52
7 F 081491 12.30 128 204 254 31 45 51
7 F 081591 09.52 144 199 279 36 54 58
7 F 081691 07.58 141 204 241 48 59 65
7 F 081791 07.15 120 201 246 46 61 62
7 F 081891 08.30 129 201 252 46 60 65
7 F 081891 12.30 122 207 270 46 66 68
7 F 081891 14.30 131 207 257 46 78 78
7 F 081891 19.00 132 208 259 30 81 74
7 F 081991 09.00 156 226 252 44 68 109
7 F 081991 13.00 158 223 270 48 102 133
7 F 082091 08.25 131 205 251 31 82 118
7 F 082091 14.27 160 218 262 50 85 135
7 F 082191 08.13 152 223 273 37 92 140
7 F 082191 14.37 191 243 287 65 113 155
7 F 082291 09.48 199 260 296 72 117 166
7 F 082291 14.30 205 270 305 83 129 183
7 F 082391 07.55 207 274 305 91 133 186
7 F 082391 14.33 221 285 312 84 136 193
7 F 082691 08.20 210 278 313 75 125 172
7 F 082791 07.55 216 286 323 83 134 200
7 F 082891 07.55 242 298 335 95 152 220
7 F 082991 09.29 256 305 313 91 153 215
7 F 083091 07.55 250 298 299 87 161 200
7 F 090391 09.30 286 323 329 96 163 236
7 F 090491 07.49 288 295 309 128 188 272
7 F 090591 09.50 288 314 349 105 187 246
7 F 090691 14.16 306 327 345 112 197 252
7 F 090991 09.38 310 343 365 152 220 285
7 F 091191 14.43 321 349 372 146 220 289
7 F 091291 09.37 323 353 356 143 229 294
7 F 091391 08.09 327 357 385 164 237 300
7 F 091691 09.25 313 251 156 396 314 341
7 F 091791 10.40 324 371 391 168 247 314
7 F 091891 07.55 349 372 406 179 268 318
7 F 092091 13.30 323 356 385 123 246 309
7 F 092391 09.21 332 361 384 160 244 309
7 F 092591 07.53 342 368 391 169 254 315
7 F 092791 08.17 354 376 406 181 270 326
7 F 093091 09.57 354 370 388 167 250 322
7 F 100291 07.47 368 389 416 190 287 340
7 F 100491 07.40 . 391 420 190 292 332
7 F 100791 13.15 374 399 404 175 261 343
7 F 101191 16.00 392 387 408 . . 350
7 F 101491 08.37 380 366 434 213 302 363
7 F 101791 09.26 389 378 415 184 286 342
7 F 102191 09.28 398 396 429 195 302 360
7 F 102491 09.46 401 401 435 215 326 374
7 F 102891 09.42 412 407 442 216 330 387
7 F 110191 12.56 416 400 437 216 300 365
7 F 110491 09.51 418 408 424 221 317 375
7 F 110791 13.26 432 422 416 246 366 415
7 F 111191 14.30 433 426 463 247 362 417
7 F 111491 09.40 427 426 451 231 331 408
7 F 111891 13.51 427 431 451 243 353 415
7 F 112791 15.40 46 435 452 92 345 316
7 F 120591 13.02 434 445 453 131 261 386
7 F 121291 13.50 443 440 210 . 359 394
7 F 012292 14.34 326 375 410 85 191 269

Appendix E: Conventional and no-tillage original neutron probe readings.

IPM1 conventional tillage, original neutron probe readings

ID	DATE	JDATE	TIME	N20	N40	N60	N80	N100	N120	N140	N160
1	07/22/91	203	1000	352	585	524	495	430	405	400	301
2	07/22/91	203	1000	292	580	558	519	461	420	371	381
3	07/22/91	203	1000	495	575	526	461	338	258	270	267
4	07/22/91	203	1000	367	592	570	497	459	400	367	400
5	07/22/91	203	1000	437	609	524	490	442	384	311	272
6	07/22/91	203	1000	311	587	565	534	459	367	321	279
7	07/22/91	203	1000	492	606	541	476	422	323	265	279
1	07/22/91	203	1016	698	597	553	.	.	.	.	.
2	07/22/91	203	1016	384	606	568	.	.	.	.	.
3	07/22/91	203	1016	597	577	534	.	.	.	.	.
4	07/22/91	203	1016	454	594	563	.	.	.	.	.
5	07/22/91	203	1016	628	609	539	.	.	.	.	.
6	07/22/91	203	1016	413	601	570	.	.	.	.	.
7	07/22/91	203	1016	582	589	546	.	.	.	.	.
1	07/22/91	203	1130	696	601	577	514	461	434	422	318
2	07/22/91	203	1130	582	674	594	565	526	468	490	466
3	07/22/91	203	1130	609	589	531	502	335	255	260	275
4	07/22/91	203	1130	597	633	563	519	480	379	381	369
5	07/22/91	203	1130	628	618	592	502	449	362	311	282
6	07/22/91	203	1130	599	614	594	553	543	403	328	299
7	07/22/91	203	1130	594	587	536	492	432	330	272	262
1	07/22/91	203	1330	710	597	575	585	558	456	444	328
2	07/22/91	203	1330	611	664	587	618	655	565	580	570
3	07/22/91	203	1330	609	594	539	509	362	262	267	282
4	07/22/91	203	1330	618	609	570	560	466	388	393	381
5	07/22/91	203	1330	631	589	572	577	456	386	306	275
6	07/22/91	203	1330	638	633	601	577	585	604	425	325
7	07/22/91	203	1330	611	606	541	507	420	321	265	277
1	07/22/91	203	1500	689	601	589	582	601	529	459	304
2	07/22/91	203	1500	621	667	604	614	647	599	626	570
3	07/22/91	203	1500	606	597	541	507	369	255	260	284
4	07/22/91	203	1500	623	631	575	553	519	396	396	369
5	07/22/91	203	1500	628	606	587	572	534	398	311	275
6	07/22/91	203	1500	657	623	604	575	606	628	507	308
7	07/22/91	203	1500	611	604	560	502	420	323	262	272
1	07/22/91	203	745	727	626	606	604	628	623	585	352
2	07/22/91	203	745	628	667	582	599	662	628	677	633
3	07/22/91	203	745	597	594	555	543	420	275	270	272
4	07/22/91	203	745	643	621	582	585	565	534	410	381
5	07/22/91	203	745	626	609	589	575	582	560	386	279
6	07/22/91	203	745	640	652	623	577	604	657	599	381
7	07/22/91	203	745	626	611	592	539	449	323	265	275
1	07/23/91	204	615	725	621	587	592	597	628	601	577
2	07/23/91	204	615	635	657	599	609	672	643	689	677
3	07/23/91	204	615	631	597	558	565	551	364	270	279
4	07/23/91	204	615	640	618	585	565	572	563	599	507
5	07/23/91	204	615	643	618	585	568	568	568	565	524
6	07/23/91	204	615	674	626	587	582	601	623	623	580
7	07/23/91	204	615	635	597	582	575	553	507	306	265
1	07/23/91	204	1055	720	599	599	575	611	621	611	580
2	07/23/91	204	1055	635	684	611	606	701	621	674	667
3	07/23/91	204	1055	611	606	565	575	560	476	272	287
4	07/23/91	204	1055	623	614	592	570	587	572	599	570
5	07/23/91	204	1055	647	601	575	582	580	560	575	568
6	07/23/91	204	1055	669	643	604	565	592	616	621	582
7	07/23/91	204	1055	628	618	587	560	558	553	476	299
1	07/23/91	204	1600	742	621	597	587	604	645	616	592
2	07/23/91	204	1600	621	657	609	621	660	640	674	681
3	07/23/91	204	1600	628	606	580	568	565	529	362	284
4	07/23/91	204	1600	628	633	594	585	582	570	616	580
5	07/23/91	204	1600	647	606	575	587	582	585	575	572
6	07/23/91	204	1600	686	645	599	599	601	621	635	616
7	07/23/91	204	1600	621	618	609	565	575	560	548	400
1	07/26/91	207	1225	713	616	587	551	529	560	585	541
2	07/26/91	207	1225	568	645	609	570	577	565	548	551
3	07/26/91	207	1225	626	616	565	548	524	531	507	555
4	07/26/91	207	1225	657	616	570	541	519	512	568	587
5	07/26/91	207	1225	640	621	587	558	531	495	536	546
6	07/26/91	207	1225	631	638	601	594	553	548	575	582
7	07/26/91	207	1225	640	623	577	536	536	514	536	555
1	07/28/91	209	800	735	618	592	618	611	635	623	592
2	07/28/91	209	800	614	650	599	601	616	609	664	677
3	07/28/91	209	800	623	604	582	582	585	589	582	589
4	07/28/91	209	800	657	628	587	575	577	587	618	611
5	07/28/91	209	800	660	609	597	580	580	587	570	606
6	07/28/91	209	800	647	667	604	585	606	611	626	633
7	07/28/91	209	800	633	631	587	572	580	570	594	609
1	07/28/91	209	1830	720	631	589	604	614	643	609	599
2	07/28/91	209	1830	604	645	616	594	604	621	664	660
3	07/28/91	209	1830	621	616	565	580	582	587	572	599
4	07/28/91	209	1830	640	633	614	585	570	580	609	606
5	07/28/91	209	1830	664	618	609	565	577	572	568	621
6	07/28/91	209	1830	628	652	618	594	599	621	628	611
7	07/28/91	209	1830	628	631	592	577	563	572	604	601
1	07/29/91	210	630	737	635	594	589	606	643	631	599
2	07/29/91	210	630	611	645	614	592	621	621	691	652
3	07/29/91	210	630	631	606	572	587	585	568	582	609
4	07/29/91	210	630	655	616	609	580	587	587	628	611
5	07/29/91	210	630	645	618	592	575	551	587	587	616
6	07/29/91	210	630	650	664	592	594	587	618	628	628
7	07/29/91	210	630	623	614	601	582	570	553	597	611
1	07/29/91	210	930	655	633	594	614	611	621	616	604
2	07/29/91	210	930	616	650	601	597	594	604	614	657
3	07/29/91	210	930	609	609	575	563	570	582	575	604
4	07/29/91	210	930	631	623	575	589	577	587	633	609
5	07/29/91	210	930	645	626	589	565	577	587	577	623
6	07/29/91	210	930	645	623	601	592	565	621	626	635
7	07/29/91	210	930	618	611	601	572	572	560	589	616
1	07/29/91	210	1225	635	609	594	575	614	631	609	585
2	07/29/91	210	1225	585	638	597	592	577	594	606	667
3	07/29/91	210	1225	587	606	565	587	565	577	570	611
4	07/29/91	210	1225	633	621	599	572	572	548	623	611
5	07/29/91	210	1225	606	618	589	572	558	587	580	604
6	07/29/91	210	1225	626	643	585	589	560	628	628	616
7	07/29/91	210	1225	621	616	585	582	568	589	601	604
1	07/29/91	210	1445	635	601	592	565	589	616	599	589
2	07/29/91	210	1445	565	643	597	582	575	599	599	623

3	07/29/91	210	1445	606	599	585	572	570	575	570	618
4	07/29/91	210	1445	643	618	577	565	563	575	616	609
5	07/29/91	210	1445	599	604	570	563	555	585	585	594
6	07/29/91	210	1445	628	623	618	582	568	621	611	628
7	07/29/91	210	1445	606	633	594	577	553	548	589	611
1	07/29/91	210	2030	614	599	582	565	577	589	594	582
2	07/29/91	210	2030	555	628	604	558	551	570	599	618
3	07/29/91	210	2030	589	604	570	558	553	565	572	587
4	07/29/91	210	2030	626	640	582	560	551	555	614	594
5	07/29/91	210	2030	614	609	580	558	558	563	560	587
6	07/29/91	210	2030	626	604	599	580	541	599	616	599
7	07/29/91	210	2030	616	626	585	541	555	560	558	606
1	07/30/91	211	1430	604	623	570	560	568	599	582	580
2	07/30/91	211	1430	551	643	594	563	558	555	582	604
3	07/30/91	211	1430	592	604	563	560	560	536	563	594
4	07/30/91	211	1430	638	616	577	555	539	548	606	594
5	07/30/91	211	1430	597	609	563	558	541	551	558	580
6	07/30/91	211	1430	611	614	594	565	531	594	616	599
7	07/30/91	211	1430	621	614	582	560	553	529	558	616
1	07/30/91	211	655	614	616	582	558	558	565	575	572
2	07/30/91	211	655	529	640	604	568	541	563	582	599
3	07/30/91	211	655	604	594	570	548	548	541	551	575
4	07/30/91	211	655	614	626	577	539	536	514	572	599
5	07/30/91	211	655	604	606	563	548	536	541	551	575
6	07/30/91	211	655	609	611	587	570	514	572	618	606
7	07/30/91	211	655	609	609	565	543	539	519	555	589
1	07/30/91	211	1048	594	621	587	543	558	572	599	582
2	07/30/91	211	1048	529	631	594	558	526	560	585	599
3	07/30/91	211	1048	594	594	558	541	546	541	536	563
4	07/30/91	211	1048	621	631	575	534	539	524	582	592
5	07/30/91	211	1048	616	604	565	548	539	543	543	585
6	07/30/91	211	1048	609	623	589	553	517	592	582	601
7	07/30/91	211	1048	597	604	582	568	546	536	577	592
1	07/30/91	211	2020	572	601	582	539	539	560	575	553
2	07/30/91	211	2020	514	611	558	519	548	551	587	572
3	07/30/91	211	2020	599	592	563	529	531	519	529	560
4	07/30/91	211	2020	606	621	580	541	524	512	592	589
5	07/30/91	211	2020	604	616	565	541	526	536	522	577
6	07/30/91	211	2020	611	631	594	558	514	585	580	614
7	07/30/91	211	2020	606	611	575	548	534	509	558	580
1	07/31/91	212	700	568	621	565	536	551	558	570	555
2	07/31/91	212	700	509	626	616	541	512	529	541	565
3	07/31/91	212	700	589	611	568	548	529	524	526	543
4	07/31/91	212	700	628	609	570	536	509	507	563	582
5	07/31/91	212	700	599	606	565	534	517	522	531	575
6	07/31/91	212	700	614	618	572	563	502	565	577	597
7	07/31/91	212	700	611	604	568	548	526	529	548	577
1	07/31/91	212	1240	575	621	577	548	519	551	570	560
2	07/31/91	212	1240	490	635	585	558	505	536	541	570
3	07/31/91	212	1240	594	604	555	536	526	529	514	553
4	07/31/91	212	1240	621	626	551	526	505	509	570	582
5	07/31/91	212	1240	589	604	563	539	514	531	543	553
6	07/31/91	212	1240	609	616	580	565	502	565	599	582
7	07/31/91	212	1240	609	618	563	539	524	517	543	570
1	07/31/91	212	2030	570	611	553	524	531	541	572	548
2	07/31/91	212	2030	502	626	592	539	519	522	524	575
3	07/31/91	212	2030	577	599	553	551	519	517	534	529
4	07/31/91	212	2030	614	623	560	529	512	514	560	599
5	07/31/91	212	2030	594	606	575	541	509	517	531	555
6	07/31/91	212	2030	618	621	580	546	488	555	577	587
7	07/31/91	212	2030	599	618	568	551	519	505	548	565
1	08/01/91	213	600	568	626	555	541	534	529	570	551
2	08/01/91	213	600	497	623	597	560	531	522	536	565
3	08/01/91	213	600	589	604	546	534	507	514	509	541
4	08/01/91	213	600	626	631	558	524	517	495	558	572
5	08/01/91	213	600	597	618	565	534	529	512	529	541
6	08/01/91	213	600	589	628	565	539	483	548	563	585
7	08/01/91	213	600	597	604	548	534	507	519	534	553
1	08/01/91	213	1930	555	606	568	526	536	546	558	539
2	08/01/91	213	1930	500	638	592	543	507	531	519	539
3	08/01/91	213	1930	582	609	553	541	502	500	495	531
4	08/01/91	213	1930	611	621	568	548	505	490	558	575
5	08/01/91	213	1930	594	597	539	539	505	502	514	536
6	08/01/91	213	1930	594	616	575	543	497	553	570	570
7	08/01/91	213	1930	609	611	563	529	514	495	522	536
1	08/02/91	214	1530	572	594	548	526	519	529	551	541
2	08/02/91	214	1530	473	616	592	546	526	517	512	555
3	08/02/91	214	1530	560	587	551	524	512	505	502	534
4	08/02/91	214	1530	599	616	555	517	495	483	543	568
5	08/02/91	214	1530	570	601	558	509	500	505	505	519
6	08/02/91	214	1530	597	618	585	543	480	548	548	580
7	08/02/91	214	1530	604	614	560	543	500	495	517	555
1	08/04/91	216	1200	551	616	539	514	512	512	529	526
2	08/04/91	216	1200	456	631	604	536	497	485	505	546
3	08/04/91	216	1200	585	587	536	519	500	473	490	505
4	08/04/91	216	1200	594	609	553	522	476	466	529	565
5	08/04/91	216	1200	587	601	560	524	488	502	492	507
6	08/04/91	216	1200	597	587	589	541	476	534	543	565
7	08/04/91	216	1200	597	599	543	541	476	534	543	565
1	08/05/91	217	1430	546	609	551	505	490	507	529	509
2	08/05/91	217	1430	463	611	585	529	478	492	478	524
3	08/05/91	217	1430	570	604	541	509	483	476	480	505
4	08/05/91	217	1430	609	604	551	509	485	488	536	575
5	08/05/91	217	1430	575	606	546	519	497	488	505	514
6	08/05/91	217	1430	594	601	558	536	478	534	546	575
7	08/05/91	217	1430	604	580	548	529	492	461	507	529
1	08/06/91	218	1530	558	587	541	507	497	505	522	517
2	08/06/91	218	1530	466	618	558	531	492	495	502	514
3	08/06/91	218	1530	582	587	555	526	490	483	476	505
4	08/06/91	218	1530	623	611	541	509	478	471	524	551
5	08/06/91	218	1530	587	618	546	524	502	497	488	495
6	08/06/91	218	1530	611	614	570	529	468	517	553	570
7	08/06/91	218	1530	592	592	555	524	480	480	507	507
1	08/07/91	219	1230	546	604	541	517	497	509	536	519
2	08/07/91	219	1230	463	626	592	517	478	485	497	524
3	08/07/91	219	1230	568	589	539	529	483	461	466	509
4	08/07/91	219	1230	616	606	558	519	483	468	519	565
5	08/07/91	219	1230	582	592	543	509	502	478	502	512
6	08/07/91	219	1230	594	633	558	536	478	505	524	555
7	08/07/91	219	1230	611	599	543	524	483	461	502	536
1	08/08/91	220	1515	539	606	531	534	495	490	526	512
2	08/08/91	220	1515	449	604	570	522	483	476	483	507
3	08/08/91	220	1515	594	594	543	529	495	473	459	509
4	08/08/91	220	1515	580	604	541	514	471	473	531	560
5	08/08/91	220	1515	575	589	543	517	488	485	483	514
6	08/08/91	220	1515	606	616	563	526	451	507	551	580
7	08/08/91	220	1515	604	597	539	502	485	466	502	517
1	08/09/91	221	1435	534	589	548	507	480	495	519	524
2	08/09/91	221	1435	442	616	570	524	490	468	476	519
3	08/09/91	221	1435	594	582	519	505	478	471	471	497
4	08/09/91	221	1435	587	614	548	514	478	461	524	563
5	08/09/91	221	1435	558	589	536	502	490	463	495	488
6	08/09/91	221	1435	582	609	558	522	456	507	553	565
7	08/09/91	221	1435	606	597	534	517	466	461	495	512
1	08/11/91	223	1210	531	611	529	514	478	483	526	512
2	08/11/91	223	1210	430	618	575	514	476	492	480	509
3	08/11/91	223	1210	592	597	546	507	473	449	463	512
4	08/11/91	223	1210	592	597	534	483	446	454	529	575
5	08/11/91	223	1210	558	601	541	517	480	466	473	505
6	08/11/91	223	1210	582	618	568	509	451	495	526	563
7	08/11/91	223	1210	604	604	553	509	459	454	483	529
1	08/12/91	224	1345	517	604	536	509	476	483	524	495
2	08/12/91	224	1345	437	626	582	509	473	471	471	502
3	08/12/91	224	1345	568	592	536	522	461	456	454	480

4	08/12/91	224	1345	587	599	522	497	466	449	526	558
5	08/12/91	224	1345	555	589	548	497	471	471	466	500
6	08/12/91	224	1345	594	601	575	519	463	505	524	546
7	08/12/91	224	1345	599	594	529	514	483	449	505	519
1	08/14/91	226	850	512	597	529	519	478	478	512	507
2	08/14/91	226	850	439	618	570	524	476	483	461	483
3	08/14/91	226	850	582	582	526	505	485	456	439	492
4	08/14/91	226	850	577	597	539	495	459	451	502	548
5	08/14/91	226	850	570	585	524	509	473	463	480	478
6	08/14/91	226	850	582	599	570	524	449	495	534	536
7	08/14/91	226	850	594	592	536	502	461	444	502	512
1	08/17/91	229	1000	517	601	514	507	478	473	507	490
2	08/17/91	229	1000	427	628	565	522	485	449	466	497
3	08/17/91	229	1000	589	585	526	502	459	451	456	490
4	08/17/91	229	1000	587	609	512	490	444	442	536	548
5	08/17/91	229	1000	563	580	531	505	456	456	471	480
6	08/17/91	229	1000	580	618	565	531	454	490	524	560
7	08/17/91	229	1000	604	604	534	505	473	454	480	517
1	08/19/91	231	1045	551	592	543	490	451	476	490	497
2	08/19/91	231	1045	434	614	570	522	456	461	434	483
3	08/19/91	231	1045	563	587	529	488	456	446	444	480
4	08/19/91	231	1045	587	594	529	497	446	439	524	558
5	08/19/91	231	1045	568	606	529	505	483	449	468	483
6	08/19/91	231	1045	577	609	558	524	439	485	526	560
7	08/19/91	231	1045	618	587	536	483	468	444	502	524
1	08/22/91	234	730	512	575	536	485	463	478	495	502
2	08/22/91	234	730	410	609	580	519	459	446	442	483
3	08/22/91	234	730	582	587	529	509	456	456	442	471
4	08/22/91	234	730	575	611	529	478	461	449	507	560
5	08/22/91	234	730	546	599	536	509	466	456	454	483
6	08/22/91	234	730	580	611	568	529	432	483	524	553
7	08/22/91	234	730	597	580	531	502	459	437	480	500
1	08/26/91	238	1330	509	582	522	507	461	461	497	480
2	08/26/91	238	1330	415	606	555	514	461	442	449	480
3	08/26/91	238	1330	582	582	512	495	449	425	442	483
4	08/26/91	238	1330	548	587	519	483	446	437	517	553
5	08/26/91	238	1330	555	580	536	495	473	449	456	473
6	08/26/91	238	1330	582	609	546	509	432	471	512	531
7	08/26/91	238	1330	589	585	522	500	449	425	478	507
1	08/29/91	241	800	519	568	536	488	454	461	490	502
2	08/29/91	241	800	427	614	560	505	451	451	434	476
3	08/29/91	241	800	570	558	514	495	454	444	432	466
4	08/29/91	241	800	572	599	509	492	434	420	507	536
5	08/29/91	241	800	551	570	531	485	444	434	456	468
6	08/29/91	241	800	577	604	548	517	432	480	502	551
7	08/29/91	241	800	601	572	519	497	449	425	485	495
1	09/03/91	246	756	514	585	531	485	449	456	483	492
2	09/03/91	246	756	432	606	570	507	439	442	425	478
3	09/03/91	246	756	565	587	541	488	442	432	422	466
4	09/03/91	246	756	572	597	514	488	432	432	526	553
5	09/03/91	246	756	539	577	534	485	466	437	451	449
6	09/03/91	246	756	575	592	536	502	420	468	517	546
7	09/03/91	246	756	599	575	522	490	451	427	488	502
1	09/05/91	248	819	495	575	519	488	459	466	485	483
2	09/05/91	248	819	413	589	570	517	466	432	427	490
3	09/05/91	248	819	570	589	524	483	444	437	413	461
4	09/05/91	248	819	565	604	512	473	437	430	509	526
5	09/05/91	248	819	551	577	517	502	446	439	451	471
6	09/05/91	248	819	568	597	553	502	427	466	529	522
7	09/05/91	248	819	575	604	512	488	442	434	476	500
1	09/09/91	252	804	502	580	529	483	444	463	495	483
2	09/09/91	252	804	408	599	558	517	461	427	437	454
3	09/09/91	252	804	553	563	519	480	444	415	432	471
4	09/09/91	252	804	572	599	522	471	420	415	509	526
5	09/09/91	252	804	536	582	519	495	456	434	446	466
6	09/09/91	252	804	568	597	551	502	420	468	512	551
7	09/09/91	252	804	582	570	522	488	451	417	502	488
1	09/12/91	255	758	580	599	529	480	451	476	478	478
2	09/12/91	255	758	413	604	541	502	444	430	430	478
3	09/12/91	255	758	471	565	524	476	437	427	437	449
4	09/12/91	255	758	563	604	512	480	430	430	507	539
5	09/12/91	255	758	536	558	524	495	454	432	442	466
6	09/12/91	255	758	565	621	560	500	427	463	519	543
7	09/12/91	255	758	599	572	509	490	451	420	468	483
1	09/16/91	259	751	553	599	529	478	459	446	483	490
2	09/16/91	259	751	417	609	560	514	449	437	427	476
3	09/16/91	259	751	551	563	512	478	439	437	417	466
4	09/16/91	259	751	565	587	505	478	422	420	519	543
5	09/16/91	259	751	534	582	531	502	446	432	427	456
6	09/16/91	259	751	565	587	555	500	413	456	529	548
7	09/16/91	259	751	592	587	517	490	449	425	473	485
1	09/20/91	263	1228	541	599	529	480	444	461	473	473
2	09/20/91	263	1228	420	594	548	512	446	432	432	471
3	09/20/91	263	1228	558	570	529	483	432	420	408	444
4	09/20/91	263	1228	570	601	517	463	427	427	517	531
5	09/20/91	263	1228	546	563	517	488	432	437	442	456
6	09/20/91	263	1228	548	594	553	505	405	456	524	548
7	09/20/91	263	1228	575	594	570	522	500	439	417	483
1	09/23/91	266	756	546	541	524	483	444	451	492	483
2	09/23/91	266	756	413	599	555	495	444	437	432	466
3	09/23/91	266	756	553	582	514	480	437	430	422	480
4	09/23/91	266	756	565	585	526	463	437	422	512	536
5	09/23/91	266	756	531	565	514	492	432	427	434	449
6	09/23/91	266	756	565	599	560	483	422	463	512	529
7	09/23/91	266	756	585	570	524	495	437	417	471	473
1	09/26/91	269	959	524	592	534	483	444	466	476	468
2	09/26/91	269	959	408	597	541	512	437	427	415	456
3	09/26/91	269	959	553	558	514	473	434	413	417	461
4	09/26/91	269	959	575	587	522	468	427	420	502	536
5	09/26/91	269	959	536	587	522	466	432	422	434	451
6	09/26/91	269	959	553	585	546	507	430	461	512	541
7	09/26/91	269	959	565	594	517	483	446	417	420	478
1	09/30/91	273	809	519	575	531	490	437	449	473	468
2	09/30/91	273	809	398	585	548	507	446	442	422	473
3	09/30/91	273	809	548	568	517	473	420	417	420	454
4	09/30/91	273	809	560	587	507	466	427	417	509	543
5	09/30/91	273	809	548	568	509	473	446	432	432	444
6	09/30/91	273	809	555	601	536	488	422	444	497	546
7	09/30/91	273	809	575	604	509	488	434	410	459	480
1	10/03/91	276	800	502	589	519	473	434	451	488	461
2	10/03/91	276	800	415	597	558	490	439	444	420	463
3	10/03/91	276	800	565	565	519	473	442	413	420	449
4	10/03/91	276	800	553	592	507	480	432	410	500	539
5	10/03/91	276	800	526	577	524	476	449	420	430	459
6	10/03/91	276	800	585	594	548	490	425	468	519	548
7	10/03/91	276	800	587	575	517	478	417	420	478	473
1	10/07/91	280	740	536	585	514	473	444	446	476	483
2	10/07/91	280	740	408	570	565	507	437	415	427	478
3	10/07/91	280	740	575	587	509	483	439	403	403	451
4	10/07/91	280	740	565	589	512	461	430	410	502	539
5	10/07/91	280	740	524	565	507	497	417	430	427	446
6	10/07/91	280	740	539	606	551	490	403	449	517	519
7	10/07/91	280	740	577	572	507	488	430	410	466	480
1	10/10/91	283	1200	507	599	522	473	437	451	480	466
2	10/10/91	283	1200	391	585	553	502	444	442	420	449
3	10/10/91	283	1200	551	587	539	483	430	422	408	446
4	10/10/91	283	1200	541	587	505	480	430	415	505	536
5	10/10/91	283	1200	524	585	519	466	439	417	432	439
6	10/10/91	283	1200	546	592	555	497	398	437	509	534
7	10/10/91	283	1200	565	575	514	485	427	403	490	473
1	10/14/91	287	746	500	592	517	478	449	449	471	478
2	10/14/91	287	746	400	580	555	492	442	422	434	456
3	10/14/91	287	746	558	577	512	473	437	410	408	446
4	10/14/91	287	746	558	585	507	466	420	408	502	536

5	10/14/91	287	746	509	558	519	485	449	410	422	442
6	10/14/91	287	746	548	592	543	497	413	446	505	541
7	10/14/91	287	746	568	582	507	483	439	405	463	483
1	10/17/91	290	751	497	582	512	490	439	439	476	478
2	10/17/91	290	751	408	592	558	490	444	417	422	471
3	10/17/91	290	751	555	568	522	478	427	405	422	449
4	10/17/91	290	751	555	587	495	468	427	403	509	519
5	10/17/91	290	751	529	568	512	480	437	427	420	439
6	10/17/91	290	751	551	618	546	492	403	454	502	526
7	10/17/91	290	751	570	582	509	473	446	400	483	480
1	10/21/91	294	751	490	587	522	492	432	437	483	473
2	10/21/91	294	751	393	587	558	488	432	427	415	466
3	10/21/91	294	751	546	570	512	480	430	403	410	451
4	10/21/91	294	751	555	582	502	468	420	405	502	529
5	10/21/91	294	751	522	575	522	478	427	420	420	444
6	10/21/91	294	751	553	577	541	500	400	403	437	509
7	10/21/91	294	751	572	558	502	473	425	403	461	461
1	10/24/91	297	800	497	599	507	468	430	449	478	468
2	10/24/91	297	800	396	582	541	502	456	422	442	459
3	10/24/91	297	800	565	568	524	478	417	398	415	427
4	10/24/91	297	800	553	599	519	463	413	408	492	534
5	10/24/91	297	800	543	570	529	483	437	405	417	449
6	10/24/91	297	800	531	599	531	502	425	456	512	534
7	10/24/91	297	800	570	582	502	483	437	400	454	476
1	10/28/91	301	800	490	568	512	463	434	437	461	461
2	10/28/91	301	800	388	601	553	490	437	425	413	449
3	10/28/91	301	800	553	553	512	463	427	413	410	439
4	10/28/91	301	800	565	580	502	454	415	398	502	529
5	10/28/91	301	800	531	568	526	488	422	420	430	439
6	10/28/91	301	800	536	585	541	495	420	434	495	536
7	10/28/91	301	800	575	585	507	485	434	398	471	476
1	11/01/91	305	1200	488	555	519	468	437	437	463	468
2	11/01/91	305	1200	386	580	553	495	432	430	410	473
3	11/01/91	305	1200	551	570	519	468	415	410	405	442
4	11/01/91	305	1200	548	594	505	463	410	410	512	541
5	11/01/91	305	1200	519	572	519	480	434	410	430	427
6	11/01/91	305	1200	539	599	553	500	403	444	507	543
7	11/01/91	305	1200	572	570	517	480	415	396	468	473
1	11/04/91	308	1200	495	582	507	483	420	437	461	476
2	11/04/91	308	1200	391	589	570	502	444	430	410	456
3	11/04/91	308	1200	546	577	524	466	417	398	420	451
4	11/04/91	308	1200	543	589	505	463	415	400	490	524
5	11/04/91	308	1200	519	565	524	490	422	425	417	434
6	11/04/91	308	1200	519	589	560	500	410	434	500	536
7	11/04/91	308	1200	560	565	509	473	427	415	473	483
1	11/07/91	312	1205	490	570	514	483	439	442	468	449
2	11/07/91	312	1205	391	582	563	497	427	417	410	461
3	11/07/91	312	1205	560	560	517	483	422	408	410	456
4	11/07/91	312	1205	543	587	512	473	415	400	507	529
5	11/07/91	312	1205	512	575	526	483	437	400	410	425
6	11/07/91	312	1205	519	582	536	514	415	444	524	536
7	11/07/91	312	1205	558	589	517	485	446	398	463	478
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3	11/11/91	315	800	558	575	507	478	432	413	405	434
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5	11/11/91	315	800	524	575	522	480	439	417	420	427
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7	11/11/91	315	800	568	572	517	466	422	398	456	473
1	11/14/91	318	800	483	594	517	473	427	432	463	468
2	11/14/91	318	800	379	594	551	500	439	413	417	449
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7	11/14/91	318	800	558	577	502	468	413	393	454	468
1	11/18/91	322	100	490	570	509	483	434	432	473	473
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6	11/27/91	331	1450	541	597	551	495	391	442	497	517
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1	12/05/91	339	1200	476	570	526	473	422	427	459	459
2	12/05/91	339	1200	369	582	536	505	425	425	410	444
3	12/05/91	339	1200	548	563	505	463	415	408	403	439
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2	12/12/91	346	1400	548	502	512	461	420	391	393	451
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4	12/12/91	346	1400	495	623	526	478	425	391	413	413
5	12/12/91	346	1400	524	570	505	473	437	400	408	427
6	12/12/91	346	1400	524	599	543	488	403	420	490	524
7	12/12/91	346	1400	563	568	505	476	430	393	456	459

IPM2 no-tillage, original neutron probe readings

ID DATE JDATE TIME N20 N40 N60 N80 N100 N120 N140 N160 N180 N200

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6 09/04/91 247 749 509 628 594 524 492 507 599 589 585 555
7 09/04/91 247 749 514 609 560 538 538 575 565 560 570 524
1 09/05/91 248 945 580 609 519 512 495 565 524 538 522 526
2 09/05/91 248 945 517 628 594 541 524 524 565 565 490 582
3 09/05/91 248 945 587 638 563 534 483 529 425 451 519 512
4 09/05/91 248 945 466 633 604 543 505 471 585 548 500 476
5 09/05/91 248 945 606 621 558 502 500 541 495 473 446 543
6 09/05/91 248 945 509 635 594 531 492 497 577 587 597 563
7 09/05/91 248 945 509 616 565 519 531 563 565 553 551 524
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2 09/06/91 249 1420 505 640 592 546 522 522 546 551 490 575
3 09/06/91 249 1420 570 633 558 534 490 538 420 451 514 507
4 09/06/91 249 1420 473 611 611 541 509 463 572 555 492 471
5 09/06/91 249 1420 599 599 551 507 480 519 480 456 432 555
6 09/06/91 249 1420 507 633 597 536 483 502 582 580 589 565
7 09/06/91 249 1420 505 618 563 541 543 568 575 541 560 507
1 09/09/91 252 938 565 592 529 502 512 555 526 522 524 517
2 09/09/91 252 938 502 640 592 531 519 500 546 558 490 587
3 09/09/91 252 938 570 631 543 541 497 509 420 461 517 483
4 09/09/91 252 938 466 618 604 553 497 461 568 541 502 471
5 09/09/91 252 938 601 606 534 495 483 514 488 480 442 543
6 09/09/91 252 938 505 621 597 512 483 480 575 582 587 553
7 09/09/91 252 938 497 611 551 538 519 572 570 538 555 519
1 09/11/91 254 1433 575 604 531 507 492 565 522 536 522 524
2 09/11/91 254 1433 505 628 587 529 500 502 551 555 488 585
3 09/11/91 254 1433 565 614 558 519 497 514 422 444 495 502
4 09/11/91 254 1433 471 616 609 541 492 456 575 553 483 454
5 09/11/91 254 1433 611 618 555 500 461 534 476 471 422 548
6 09/11/91 254 1433 507 633 606 526 478 483 577 570 585 565
7 09/11/91 254 1433 495 609 570 538 526 594 580 546 538 512
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2 09/13/91 256 809 497 626 601 529 497 509 553 548 490 587
3 09/13/91 256 809 529 621 558 519 490 512 430 454 492 507
4 09/13/91 256 809 461 626 599 548 507 463 575 548 495 468
5 09/13/91 256 809 611 611 536 502 466 522 490 468 425 548
6 09/13/91 256 809 495 631 599 526 473 488 577 565 575 551
7 09/13/91 256 809 509 609 572 529 541 580 575 553 538 495
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3 09/16/91 259 845 570 628 558 529 478 519 422 451 507 490
4 09/16/91 259 845 466 626 601 524 495 442 558 546 483 451
5 09/16/91 259 845 611 606 522 502 468 526 483 466 432 548
6 09/16/91 259 845 490 633 599 514 483 478 570 560 589 553
7 09/16/91 259 845 485 621 558 519 524 585 468 536 538 507
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3 09/17/91 260 1040 570 519 551 524 492 529 430 439 509 490
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5 09/17/91 260 1040 616 614 548 492 468 519 483 463 410 526
6 09/17/91 260 1040 485 631 577 517 466 490 575 575 589 558
7 09/17/91 260 1040 512 611 553 526 531 582 577 546 541 522
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3 09/18/91 261 755 565 621 558 512 427 514 410 456 507 490
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5 09/18/91 261 755 614 592 546 497 483 509 490 463 432 546
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7 09/18/91 261 755 480 609 575 526 526 589 565 524 553 500
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6 09/20/91 263 1330 502 616 577 524 483 476 565 565 575 553
7 09/20/91 263 1330 507 628 572 509 514 572 570 541 553 519
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2 09/23/91 266 921 483 633 589 531 505 483 570 560 485 582
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5 09/23/91 266 921 611 606 546 480 466 514 468 471 430 548
6 09/23/91 266 921 468 623 599 531 478 473 565 560 568 548
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2 09/25/91 268 753 500 645 585 538 495 502 558 546 485 570
3 09/25/91 268 753 572 638 553 536 473 502 415 444 514 502
4 09/25/91 268 753 456 611 599 529 497 449 555 531 483 449
5 09/25/91 268 753 614 597 541 497 466 514 463 451 415 604
6 09/25/91 268 753 502 616 577 524 483 476 565 565 575 553
7 09/25/91 268 753 507 628 572 509 514 572 570 524 526 512
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2 09/27/91 270 817 488 626 577 519 500 502 541 558 483 575
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6 09/27/91 270 817 483 616 575 507 546 478 565 575 563 541
7 09/27/91 270 817 485 621 555 517 534 577 548 536 543 495
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2 09/30/91 273 957 478 621 570 524 488 492 543 534 480 570
3 09/30/91 273 957 558 618 534 507 471 509 415 459 471 488
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5 09/30/91 273 957 606 580 524 488 473 524 466 451 415 548
6 09/30/91 273 957 495 614 592 514 449 485 570 563 568 553
7 09/30/91 273 957 480 611 563 505 529 570 551 543 529 512
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2 10/02/91 275 747 488 628 594 517 495 476 555 546 485 585
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5 10/02/91 275 747 609 601 529 490 459 514 483 454 432 538
6 10/02/91 275 747 485 628 592 514 463 471 548 563 575 563
7 10/02/91 275 747 485 618 558 529 534 568 548 526 529 495
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4 10/04/91 277 740 449 628 592 536 497 442 568 529 422 449
5 10/04/91 277 740 604 604 534 492 454 514 476 413 420 541
6 10/04/91 277 740 471 623 592 512 456 485 555 548 563 541
7 10/04/91 277 740 500 616 565 522 512 592 580 538 534 509
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4 10/07/91 280 900 446 611 587 526 492 449 563 531 432 451
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6 10/07/91 280 900 466 589 522 471 473 536 563 575 575 555
7 10/07/91 280 900 490 616 555 529 529 563 543 541 538 507
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2 10/11/91 284 1200 471 618 565 524 490 485 541 531 471 565
3 10/11/91 284 1200 565 616 551 502 466 507 415 434 507 485
4 10/11/91 284 1200 442 609 597 526 483 444 563 529 490 449
5 10/11/91 284 1200 594 597 538 495 451 507 468 446 427 541
6 10/11/91 284 1200 473 633 585 522 473 468 543 555 565 565
7 10/11/91 284 1200 485 611 553 519 519 543 548 538 536 505
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2 10/14/91 287 837 478 611 592 522 500 478 551 551 490 572
3 10/14/91 287 837 560 635 553 512 461 512 415 446 483 480
4 10/14/91 287 837 439 616 587 529 490 444 536 519 471 403
5 10/14/91 287 837 618 592 541 485 473 522 461 437 432 551
6 10/14/91 287 837 478 621 575 529 461 461 565 565 560 548
7 10/14/91 287 837 473 597 548 505 536 563 546 548 548 490
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4 10/17/91 290 1200 432 611 599 538 490 449 553 536 490 437
5 10/17/91 290 1200 589 587 531 483 463 502 466 444 417 551
6 10/17/91 290 1200 480 621 570 507 461 468 558 570 565 558
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2 10/21/91 294 930 463 621 577 524 507 483 546 541 473 565
3 10/21/91 294 930 529 626 570 531 473 507 420 444 480 473
4 10/21/91 294 930 425 606 594 524 478 442 570 517 478 442
5 10/21/91 294 930 601 599 531 490 451 500 466 444 415 546
6 10/21/91 294 930 471 599 587 522 471 466 553 565 570 534
7 10/21/91 294 930 478 594 555 517 524 568 553 526 529 509
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3 10/24/91 297 920 563 626 534 497 451 502 425 427 492 476
4 10/24/91 297 920 432 599 594 529 483 427 546 536 483 444
5 10/24/91 297 920 582 587 553 478 454 505 463 456 413 538
6 10/24/91 297 920 480 626 570 490 555 466 538 541 565 548
7 10/24/91 297 920 473 611 538 509 509 553 541 522 536 505
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2 10/28/91 301 932 468 604 582 522 502 476 541 529 466 560
3 10/28/91 301 932 546 635 536 502 461 507 420 442 490 478
4 10/28/91 301 932 432 597 585 534 492 434 563 541 468 449
5 10/28/91 301 932 594 601 531 473 463 502 471 444 413 529
6 10/28/91 301 932 476 609 575 517 442 463 543 548 548 538
7 10/28/91 301 932 485 604 546 519 517 577 553 536 529 507
1 11/01/91 305 1314 541 604 536 480 471 529 517 505 463 604
2 11/01/91 305 1314 466 616 570 519 485 478 543 538 468 558
3 11/01/91 305 1314 560 604 546 524 463 517 403 420 495 478
4 11/01/91 305 1314 420 585 577 531 492 437 546 531 473 444
5 11/01/91 305 1314 589 585 526 466 437 500 454 437 393 524
6 11/01/91 305 1314 459 616 582 519 434 473 548 558 563 541
7 11/01/91 305 1314 473 601 551 507 509 555 538 529 522 495
1 11/04/91 308 1000 548 587 519 492 478 555 519 497 502 502
2 11/04/91 308 1000 461 616 580 517 492 468 546 517 466 563
3 11/04/91 308 1000 565 614 534 509 463 517 405 439 490 468
4 11/04/91 308 1000 413 599 580 519 495 444 560 541 480 446
5 11/04/91 308 1000 599 599 529 492 449 512 459 430 413 531
6 11/04/91 308 1000 461 497 589 519 490 466 558 575 553 536
7 11/04/91 308 1000 478 616 555 512 526 529 555 514 519 495
1 11/07/91 311 1200 553 580 529 495 490 536 488 403 500 505
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3 11/07/91 311 1200 575 616 546 519 456 497 413 442 473 478
4 11/07/91 311 1200 434 599 597 534 473 446 543 519 478 444
5 11/07/91 311 1200 587 575 526 488 456 497 476 432 408 526
6 11/07/91 311 1200 456 623 526 502 446 449 553 572 558 546
7 11/07/91 311 1200 488 594 548 517 502 509 541 524 524 500
1 11/11/91 315 1430 531 616 517 485 476 548 500 502 495 505
2 11/11/91 315 1430 473 599 577 534 488 485 541 534 473 553
3 11/11/91 315 1430 565 604 536 519 456 495 415 444 471 459
4 11/11/91 315 1430 422 604 580 524 495 439 558 514 413 432
5 11/11/91 315 1430 594 541 526 488 454 495 466 446 403 543
6 11/11/91 315 1430 454 616 594 524 463 466 548 572 575 551
7 11/11/91 315 1430 473 606 548 492 507 560 551 531 536 490
1 11/14/91 318 945 555 572 531 483 463 534 507 500 507 507
2 11/14/91 318 945 466 614 565 512 502 478 553 529 466 560
3 11/14/91 318 945 536 626 546 517 451 502 408 449 483 461
4 11/14/91 318 945 417 601 594 529 468 427 536 524 473 444
5 11/14/91 318 945 611 601 541 473 461 517 471 437 415 524
6 11/14/91 318 945 461 594 580 492 461 468 538 572 580 529
7 11/14/91 318 945 466 609 543 512 502 558 551 524 531 507
1 11/18/91 322 1400 536 575 509 492 483 548 492 490 509 500
2 11/18/91 322 1400 444 594 587 509 512 473 548 524 466 558
3 11/18/91 322 1400 553 611 524 509 461 512 400 430 478 459
4 11/18/91 322 1400 430 601 589 529 471 434 536 531 466 449
5 11/18/91 322 1400 631 606 541 483 456 522 456 456 413 522
6 11/18/91 322 1400 488 616 585 517 461 466 538 570 553 529
7 11/18/91 322 1400 483 601 555 507 514 570 529 536 531 502
1 11/27/91 331 1200 531 575 512 473 463 538 507 509 507 507
2 11/27/91 331 1200 473 616 575 522 483 478 541 517 463 551
3 11/27/91 331 1200 548 626 563 492 459 500 398 444 478 473
4 11/27/91 331 1200 434 592 594 529 480 430 541 524 463 432
5 11/27/91 331 1200 611 592 529 485 454 505 466 437 413 534
6 11/27/91 331 1200 495 604 563 507 461 439 553 572 565 551
7 11/27/91 331 1200 466 614 558 507 509 563 548 546 522 500
1 12/05/91 339 1200 546 597 512 483 454 546 509 502 480 507
2 12/05/91 339 1200 459 618 553 507 495 492 526 529 483 548
3 12/05/91 339 1200 548 626 548 507 456 500 398 446 483 468
4 12/05/91 339 1200 434 604 616 512 476 437 551 507 478 430
5 12/05/91 339 1200 597 599 541 488 456 512 456 420 415 524
6 12/05/91 339 1200 473 623 592 519 509 442 536 587 553 522
7 12/05/91 339 1200 616 606 546 512 507 558 548 517 529 500
1 12/12/91 346 1350 519 580 601 524 490 471 543 497 490 495
2 12/12/91 346 1350 509 522 582 514 490 471 548 509 473 570
3 12/12/91 346 1350 541 592 548 497 456 502 422 459 471 473
4 12/12/91 346 1350 415 606 582 529 483 444 558 512 466 415
5 12/12/91 346 1350 628 597 543 490 459 502 463 415 410 517
6 12/12/91 346 1350 476 614 565 507 454 456 553 587 551 524
7 12/12/91 346 1350 480 599 555 502 507 546 553 519 526 514

Appendix F: Volumetric water contents calculated from neutron probe measurements.

Note: timer = 0 at the start of the drainage process , i.e. when the plots were covered with plastic to maintain a downward flux.

IPM1, clean tillage volumetric water contents

TIMER	ID	N20	N40	N60	N80	N100	N120	N140	N160
-6.952	1	.4230	.3520	.3380	.3366	.3535	.3499	.3232	.1595
-6.952	2	.3535	.3809	.3211	.3331	.3773	.3535	.3879	.3570
-6.952	3	.3317	.3296	.3022	.2937	.2073	.1054	.1019	.1033
-6.952	4	.3640	.3485	.3211	.3232	.3092	.2874	.2003	.1799
-6.952	5	.3520	.3401	.3260	.3162	.3211	.3057	.1834	.1082
-6.952	6	.3619	.3703	.3499	.3176	.3366	.3738	.3331	.1799
-6.952	7	.3520	.3415	.3282	.2909	.2277	.1391	.0984	.1054
-6.846	1	.1595	.3232	.2804	.2600	.2143	.1967	.1932	.1237
-6.846	2	.1173	.3197	.3043	.2769	.2361	.2073	.1729	.1799
-6.846	3	.2600	.3162	.2818	.2361	.1497	.0934	.1019	.0998
-6.846	4	.1700	.3282	.3127	.2614	.2347	.1932	.1700	.1932
-6.846	5	.2192	.3401	.2804	.2565	.2227	.1820	.1307	.1033
-6.846	6	.1307	.3246	.3092	.2874	.2347	.1700	.1377	.1082
-6.846	7	.2579	.3380	.2923	.2466	.2087	.1391	.0984	.1082
-6.839	1	.4026	.3317	.3007	.	.	.	.	.
-6.839	2	.1820	.3380	.3113	.	.	.	.	.
-6.839	3	.3317	.3176	.2874	.	.	.	.	.
-6.839	4	.2312	.3296	.3078	.	.	.	.	.
-6.839	5	.3535	.3401	.2909	.	.	.	.	.
-6.839	6	.2024	.3345	.3127	.	.	.	.	.
-6.839	7	.3211	.3260	.2958	.	.	.	.	.
-6.792	1	.4012	.3345	.3176	.2733	.2361	.2171	.2087	.1356
-6.792	2	.3211	.3858	.3296	.3092	.2818	.2410	.2565	.2396
-6.792	3	.3401	.3260	.2853	.2649	.1476	.0913	.0948	.1054
-6.792	4	.3317	.3570	.3078	.2769	.2494	.1785	.1799	.1714
-6.792	5	.3535	.3464	.3282	.2649	.2277	.1665	.1307	.1103
-6.792	6	.3331	.3436	.3296	.3007	.2937	.1953	.1426	.1223
-6.792	7	.3296	.3246	.2888	.2579	.2157	.1440	.1033	.0963
-6.708	1	.4111	.3317	.3162	.3232	.3043	.2326	.2241	.1426
-6.708	2	.3415	.3787	.3246	.3464	.3724	.3092	.3197	.3127
-6.708	3	.3401	.3296	.2909	.2698	.1665	.0963	.0998	.1103
-6.708	4	.3464	.3401	.3127	.3057	.2396	.1848	.1883	.1799
-6.708	5	.3556	.3260	.3141	.3176	.2326	.1834	.1272	.1054
-6.708	6	.3605	.3570	.3345	.3176	.3232	.3366	.2108	.1405
-6.708	7	.3415	.3380	.2923	.2684	.2073	.1377	.0984	.1068
-6.637	1	.3963	.3345	.3260	.3211	.3345	.2839	.2347	.1258
-6.637	2	.3485	.3809	.3366	.3436	.3668	.3331	.3520	.3127
-6.637	3	.3380	.3317	.2923	.2684	.1714	.0913	.0948	.1117
-6.637	4	.3499	.3556	.3162	.3007	.2769	.1904	.1904	.1714
-6.637	5	.3535	.3380	.3246	.3141	.2874	.1918	.1307	.1054
-6.637	6	.3738	.3499	.3366	.3162	.3380	.3535	.2684	.1286
-6.637	7	.3415	.3366	.3057	.2649	.2073	.1391	.0963	.1033
-6.006	1	.4216	.3485	.3246	.3282	.3317	.3535	.3345	.3176
-6.006	2	.3584	.3738	.3331	.3401	.3844	.3640	.3963	.3879
-6.006	3	.3556	.3317	.3043	.3092	.2993	.1679	.1019	.1082
-6.006	4	.3619	.3464	.3232	.3092	.3141	.3078	.3331	.2684
-6.006	5	.3640	.3464	.3232	.3113	.3113	.3113	.3092	.2804
-6.006	6	.3858	.3520	.3246	.3211	.3345	.3499	.3499	.3197
-6.006	7	.3584	.3317	.3211	.3162	.3007	.2684	.1272	.0984
-5.823	1	.4181	.3331	.3331	.3162	.3415	.3485	.3415	.3197
-5.823	2	.3584	.3928	.3415	.3380	.4047	.3485	.3858	.3809
-5.823	3	.3415	.3380	.3092	.3162	.3057	.2466	.1033	.1138
-5.823	4	.3499	.3436	.3282	.3127	.3246	.3141	.3331	.3127
-5.823	5	.3668	.3345	.3162	.3211	.3197	.3057	.3162	.3113
-5.823	6	.3823	.3640	.3366	.3092	.3282	.3450	.3485	.3211
-5.823	7	.3535	.3464	.3246	.3057	.3043	.3007	.2466	.1223
-5.596	1	.4336	.3485	.3317	.3246	.3366	.3654	.3450	.3282
-5.596	2	.3485	.3738	.3401	.3485	.3759	.3619	.3858	.3907
-5.596	3	.3535	.3380	.3197	.3113	.3092	.2839	.1665	.1117
-5.596	4	.3535	.3570	.3296	.3232	.3211	.3127	.3450	.3197
-5.596	5	.3668	.3380	.3162	.3246	.3211	.3232	.3162	.3141
-5.596	6	.3942	.3654	.3331	.3331	.3345	.3485	.3584	.3450
-5.596	7	.3485	.3464	.3401	.3092	.3162	.3057	.2972	.1932
-2.752	1	.4132	.3450	.3246	.2993	.2839	.3057	.3232	.2923
-2.752	2	.3113	.3654	.3401	.3127	.3176	.3092	.2972	.2993
-2.752	3	.3520	.3450	.3092	.2972	.2804	.2853	.2684	.3022
-2.752	4	.3738	.3450	.3127	.2923	.2769	.2719	.3113	.3246
-2.752	5	.3619	.3485	.3246	.3043	.2853	.2600	.2888	.2958
-2.752	6	.3556	.3605	.3345	.3296	.3007	.2972	.3162	.3211
-2.752	7	.3619	.3499	.3176	.2888	.2888	.2733	.2888	.3022
-0.929	1	.4286	.3464	.3282	.3464	.3415	.3584	.3499	.3282
-0.929	2	.3436	.3689	.3331	.3345	.3450	.3401	.3787	.3879
-0.929	3	.3499	.3366	.3211	.3211	.3232	.3260	.3211	.3260
-0.929	4	.3738	.3535	.3246	.3162	.3176	.3246	.3464	.3415
-0.929	5	.3759	.3401	.3317	.3197	.3197	.3246	.3127	.3380
-0.929	6	.3668	.3809	.3366	.3232	.3380	.3415	.3520	.3570
-0.929	7	.3570	.3556	.3246	.3141	.3197	.3127	.3296	.3401
-0.500	1	.4181	.3556	.3260	.3366	.3436	.3640	.3401	.3331
-0.500	2	.3366	.3654	.3450	.3296	.3366	.3485	.3787	.3759
-0.500	3	.3485	.3450	.3092	.3197	.3211	.3246	.3141	.3331
-0.500	4	.3619	.3570	.3436	.3232	.3127	.3197	.3401	.3380
-0.500	5	.3787	.3464	.3401	.3092	.3176	.3141	.3113	.3485
-0.500	6	.3535	.3703	.3464	.3296	.3331	.3485	.3535	.3415
-0.500	7	.3535	.3556	.3282	.3176	.3078	.3141	.3366	.3345
0.000	1	.4300	.3584	.3296	.3260	.3380	.3640	.3556	.3331
0.000	2	.3415	.3654	.3436	.3282	.3485	.3485	.3977	.3703
0.000	3	.3556	.3380	.3141	.3246	.3232	.3113	.3211	.3401
0.000	4	.3724	.3450	.3401	.3197	.3246	.3246	.3535	.3415
0.000	5	.3654	.3464	.3282	.3162	.2993	.3246	.3246	.3450
0.000	6	.3689	.3787	.3282	.3296	.3246	.3464	.3535	.3535
0.000	7	.3499	.3436	.3345	.3211	.3127	.3007	.3317	.3415
0.125	1	.3724	.3570	.3296	.3436	.3415	.3485	.3450	.3366
0.125	2	.3450	.3689	.3345	.3317	.3296	.3366	.3436	.3738
0.125	3	.3401	.3401	.3162	.3078	.3127	.3211	.3162	.3366
0.125	4	.3556	.3499	.3162	.3260	.3176	.3246	.3570	.3401
0.125	5	.3654	.3520	.3260	.3092	.3176	.3246	.3176	.3499
0.125	6	.3654	.3499	.3345	.3282	.3092	.3485	.3520	.3584
0.125	7	.3464	.3415	.3345	.3141	.3141	.3057	.3260	.3450

0.125	4	.3556	.3499	.3162	.3260	.3176	.3246	.3570	.3401
0.125	5	.3654	.3520	.3260	.3092	.3176	.3246	.3176	.3499
0.125	6	.3654	.3499	.3345	.3282	.3092	.3485	.3520	.3584
0.125	7	.3464	.3415	.3345	.3141	.3141	.3057	.3260	.3450
0.248	1	.3584	.3401	.3296	.3162	.3436	.3556	.3401	.3232
0.248	2	.3232	.3605	.3317	.3282	.3176	.3296	.3380	.3809
0.248	3	.3246	.3380	.3092	.3246	.3092	.3176	.3127	.3415
0.248	4	.3570	.3485	.3331	.3141	.3141	.2972	.3499	.3415
0.248	5	.3380	.3464	.3260	.3141	.3043	.3246	.3197	.3366
0.248	6	.3520	.3640	.3232	.3260	.3057	.3535	.3535	.3450
0.248	7	.3485	.3450	.3232	.3211	.3113	.3260	.3345	.3366
0.340	1	.3584	.3345	.3282	.3092	.3260	.3450	.3331	.3260
0.340	2	.3092	.3640	.3317	.3211	.3162	.3331	.3331	.3499
0.340	3	.3380	.3331	.3232	.3141	.3127	.3162	.3127	.3464
0.340	4	.3640	.3464	.3176	.3092	.3078	.3162	.3450	.3401
0.340	5	.3331	.3366	.3127	.3078	.3022	.3232	.3232	.3296
0.340	6	.3535	.3499	.3464	.3211	.3113	.3485	.3415	.3535
0.340	7	.3380	.3570	.3296	.3176	.3007	.2972	.3260	.3415
0.583	1	.3436	.3331	.3211	.3092	.3176	.3260	.3296	.3211
0.583	2	.3022	.3535	.3366	.3043	.2993	.3127	.3331	.3464
0.583	3	.3260	.3366	.3127	.3043	.3007	.3092	.3141	.3246
0.583	4	.3520	.3619	.3211	.3057	.2993	.3022	.3436	.3296
0.583	5	.3436	.3401	.3197	.3043	.3043	.3078	.3057	.3246
0.583	6	.3520	.3366	.3331	.3197	.2923	.3331	.3450	.3331
0.583	7	.3450	.3520	.3232	.2923	.3022	.3057	.3043	.3380
1.010	1	.3436	.3450	.3211	.3043	.3043	.3092	.3162	.3141
1.010	2	.2839	.3619	.3366	.3113	.2923	.3078	.3211	.3331
1.010	3	.3366	.3296	.3127	.2972	.2972	.2923	.2993	.3162
1.010	4	.3436	.3520	.3176	.2909	.2888	.2733	.3141	.3331
1.010	5	.3366	.3380	.3078	.2972	.2888	.2923	.2993	.3162
1.010	6	.3401	.3415	.3246	.3127	.2733	.3141	.3464	.3380
1.010	7	.3401	.3401	.3092	.2937	.2909	.2769	.3022	.3260
1.174	1	.3296	.3485	.3246	.2937	.3043	.3141	.3331	.3211
1.174	2	.2839	.3556	.3296	.3043	.2818	.3057	.3232	.3331
1.174	3	.3296	.3296	.3043	.2923	.2958	.2923	.2888	.3078
1.174	4	.3485	.3556	.3162	.2874	.2909	.2804	.3211	.3282
1.174	5	.3450	.3366	.3092	.2972	.2909	.2937	.2937	.3232
1.174	6	.3401	.3499	.3260	.3007	.2754	.3282	.3211	.3345
1.174	7	.3317	.3366	.3211	.3113	.2958	.2888	.3176	.3282
1.333	1	.3366	.3499	.3127	.3057	.3113	.3331	.3211	.3197
1.333	2	.2993	.3640	.3296	.3078	.3043	.3022	.3211	.3366
1.333	3	.3282	.3366	.3078	.3057	.3057	.2888	.3078	.3296
1.333	4	.3605	.3450	.3176	.3022	.2909	.2972	.3380	.3296
1.333	5	.3317	.3401	.3078	.3043	.2923	.2993	.3043	.3197
1.333	6	.3415	.3436	.3296	.3092	.2853	.3296	.3450	.3331
1.333	7	.3485	.3436	.3211	.3057	.3007	.2839	.3043	.3450
1.579	1	.3141	.3345	.3211	.2909	.2909	.3057	.3162	.3007
1.579	2	.2733	.3415	.3043	.2769	.2972	.2993	.3246	.3141
1.579	3	.3331	.3282	.3078	.2839	.2853	.2769	.2839	.3057
1.579	4	.3380	.3485	.3197	.2923	.2804	.2719	.3282	.3260
1.579	5	.3366	.3450	.3092	.2923	.2818	.2888	.2790	.3176
1.579	6	.3415	.3556	.3296	.3043	.2733	.3232	.3197	.3436
1.579	7	.3380	.3415	.3162	.2972	.2874	.2698	.3043	.3197
2.029	1	.3113	.3485	.3092	.2888	.2993	.3043	.3127	.3022
2.029	2	.2698	.3520	.3450	.2923	.2719	.2839	.2923	.3092
2.029	3	.3260	.3415	.3113	.2972	.2839	.2804	.2818	.2937
2.029	4	.3535	.3401	.3127	.2888	.2698	.2684	.3078	.3211
2.029	5	.3331	.3380	.3092	.2874	.2754	.2790	.2853	.3162
2.029	6	.3436	.3464	.3141	.3078	.2649	.3092	.3176	.3317
2.029	7	.3415	.3366	.3113	.2972	.2818	.2839	.2972	.3176
2.254	1	.3162	.3485	.3176	.2972	.2769	.2993	.3127	.3057
2.254	2	.2565	.3584	.3232	.3043	.2670	.2888	.2923	.3127
2.254	3	.3296	.3366	.3022	.2888	.2818	.2839	.2733	.3007
2.254	4	.3485	.3520	.2993	.2818	.2670	.2698	.3127	.3211
2.254	5	.3260	.3366	.3078	.2909	.2733	.2853	.2937	.3007
2.254	6	.3401	.3450	.3197	.3092	.2649	.3092	.3331	.3211
2.254	7	.3401	.3464	.3078	.2909	.2804	.2754	.2937	.3127
2.583	1	.3127	.3415	.3007	.2804	.2853	.2923	.3141	.2972
2.583	2	.2649	.3520	.3282	.2909	.2769	.2790	.2804	.3162
2.583	3	.3176	.3331	.3007	.2993	.2769	.2754	.2874	.2839
2.583	4	.3436	.3499	.3057	.2839	.2719	.2733	.3057	.3331
2.583	5	.3296	.3380	.3162	.2923	.2698	.2754	.2853	.3022
2.583	6	.3464	.3485	.3197	.2958	.2551	.3022	.3176	.3246
2.583	7	.3331	.3464	.3113	.2993	.2769	.2670	.2972	.3092
2.987	1	.3113	.3520	.3022	.2923	.2874	.2839	.3127	.2993
2.987	2	.2614	.3499	.3317	.3057	.2853	.2790	.2888	.3092
2.987	3	.3260	.3366	.2958	.2874	.2684	.2733	.2698	.2923
2.987	4	.3520	.3556	.3043	.2804	.2754	.2600	.3043	.3141
2.987	5	.3317	.3464	.3092	.2874	.2839	.2719	.2839	.2923
2.987	6	.3260	.3535	.3092	.2909	.2516	.2972	.3078	.3232
2.987	7	.3317	.3366	.2972	.2874	.2684	.2769	.2874	.3007
3.542	1	.3022	.3380	.3113	.2818	.2888	.2958	.3043	.2909
3.542	2	.2635	.3605	.3282	.2937	.2684	.2853	.2769	.2909
3.542	3	.3211	.3401	.3007	.2923	.2649	.2635	.2600	.2853
3.542	4	.3415	.3485	.3113	.2972	.2670	.2565	.3043	.3162
3.542	5	.3296	.3317	.2909	.2909	.2670	.2649	.2733	.2888
3.542	6	.3296	.3450	.3162	.2937	.2614	.3007	.3127	.3127
3.542	7	.3401	.3415	.3078	.2839	.2733	.2600	.2790	.2888
4.375	1	.3141	.3296	.2972	.2818	.2769	.2839	.2993	.2923
4.375	2	.2445	.3450	.3282	.2958	.2818	.2754	.2719	.3022
4.375	3	.3057	.3246	.2993	.2804	.2719	.2670	.2649	.2874
4.375	4	.3331	.3450	.3022	.2754	.2600	.2516	.2937	.3113
4.375	5	.3127	.3345	.3043	.2698	.2635	.2670	.2670	.2769
4.375	6	.3317	.3464	.3232	.2937	.2494	.2972	.2972	.3197
4.375	7	.3366	.3436	.3057	.2937	.2635	.2600	.2754	.3022
6.237	1	.2993	.3450	.2909	.2733	.2719	.2719	.2839	.2818
6.237	2	.2326	.3556	.3366	.2888	.2614	.2530	.2670	.2958
6.237	3	.3232	.3246	.2888	.2769	.2635	.2445	.2565	.2670
6.237	4	.3296	.3401	.3007	.2790	.2466	.2396	.2839	.3092
6.237	5	.3246	.3345	.3057	.2804	.2551	.2649	.2579	.2684
6.237	6	.3317	.3246	.3260	.2923	.2466	.2874	.2937	.3092
6.237	7	.3317	.3331	.2937	.2923	.2466	.2874	.2937	.3092
7.333	1	.2958	.3401	.2993	.2670	.2565	.2684	.2839	.2698
7.333	2	.2375	.3415	.3232	.2839	.2480	.2579	.2480	.2804
7.333	3	.3127	.3366	.2923	.2698	.2516	.2466	.2494	.2670
7.333	4	.3401	.3366	.2993	.2698	.2530	.2551	.2888	.3162
7.333	5	.3162	.3380	.2958	.2769	.2614	.2551	.2670	.2733
7.333	6	.3296	.3345	.3043	.2888	.2480	.2874	.2958	.3162
7.333	7	.3366	.3197	.2972	.2839	.2579	.2361	.2684	.2839
8.375	1	.3043	.3246	.2923	.2684	.2614	.2670	.2790	.2754
8.375	2	.2396	.3464	.3043	.2853	.2579	.2600	.2649	.2733
8.375	3	.3211	.3246	.3022	.2818	.2565	.2516	.2466	.2670
8.375	4	.3499	.3415	.2923	.2698	.2480	.2431	.2804	.2993
8.375	5	.3246	.3464	.2958	.2804	.2649	.2614	.2551	.2600
8.375	6	.3415	.3436	.3127	.2839	.2410	.2754	.3007	.3127
8.375	7	.3282	.3282	.3022	.2804	.2494	.2494	.2684	.2684
9.250	1	.2958	.3366	.2923	.2754	.2614	.2698	.2888	.2769
9.250	2	.2375	.3520	.3282	.2754	.2480	.2530	.2614	.2804
9.250	3	.3113	.3260	.2909	.2839	.2516	.2361	.2396	.2698
9.250	4	.3450	.3380	.3043	.2769	.2516	.2410	.2769	.3092
9.250	5	.3211	.3282	.2937	.2698	.2649	.2480	.2649	.2719
9.250	6	.3296	.3570	.3043	.2888	.2480	.2670	.2804	.3022
9.250	7	.3415	.3331	.2937	.2804	.2516	.2361	.2649	.2888
10.369	1	.2909	.3380	.2853	.2874	.2600	.2565	.2818	.2719
10.369	2	.2277	.3366	.3127	.2790	.2516	.2466	.2516	.2684
10.369	3	.3296	.3296	.2937	.2839	.2600	.2445	.2347	.2698
10.369	4	.3197	.3366	.2923	.2733	.2431	.2445	.2853	.3057
10.369	5	.3162	.3260	.2937	.2754	.2551	.2530	.2516	.2733
10.369	6	.3380	.3450	.3078	.2818	.2291	.2684	.2993	.3197
10.369	7	.3366	.3317	.2909	.2649	.2530	.2396	.2649	.2754
11.335	1	.2874	.3260	.2972	.2684	.2494	.2600	.2769	.2804
11.335	2	.2227	.3450	.3127	.2804	.2565	.2410	.2466	.2769
11.335	3	.3296	.3211	.2769	.2670	.2480	.2431	.2431	.2614
11.335	4	.3246	.3436	.2972	.2733	.2480	.2361	.2804	.3078

11.335 5 .3043 .3260 .2888 .2649 .2565 .2375 .2600 .2551
11.335 6 .3211 .3401 .3043 .2790 .2326 .2684 .3007 .3092
11.335 7 .3380 .3317 .2874 .2754 .2396 .2361 .2600 .2719
13.242 1 .2853 .3415 .2839 .2733 .2480 .2516 .2818 .2719
13.242 2 .2143 .3464 .3162 .2733 .2466 .2579 .2494 .2698
13.242 3 .3282 .3317 .2958 .2684 .2445 .2277 .2375 .2719
13.242 4 .3282 .3317 .2874 .2516 .2256 .2312 .2839 .3162
13.242 5 .3043 .3345 .2923 .2754 .2494 .2396 .2445 .2670
13.242 6 .3211 .3464 .3113 .2698 .2291 .2600 .2818 .3078
13.242 7 .3366 .3366 .3007 .2698 .2347 .2312 .2516 .2839
14.298 1 .2754 .3366 .2888 .2698 .2466 .2516 .2804 .2600
14.298 2 .2192 .3520 .3211 .2698 .2445 .2431 .2431 .2649
14.298 3 .3113 .3282 .2888 .2790 .2361 .2326 .2312 .2494
14.298 4 .3246 .3331 .2790 .2614 .2396 .2277 .2818 .3043
14.298 5 .3022 .3260 .2972 .2614 .2431 .2431 .2396 .2635
14.298 6 .3296 .3345 .3162 .2769 .2375 .2670 .2804 .2958
14.298 7 .3331 .3296 .2839 .2733 .2516 .2277 .2670 .2769
16.092 1 .2719 .3317 .2839 .2769 .2480 .2480 .2719 .2684
16.092 2 .2206 .3464 .3127 .2804 .2466 .2516 .2361 .2516
16.092 3 .3211 .3211 .2818 .2670 .2530 .2326 .2206 .2579
16.092 4 .3176 .3317 .2909 .2600 .2347 .2291 .2649 .2972
16.092 5 .3127 .3232 .2804 .2698 .2445 .2375 .2494 .2480
16.092 6 .3211 .3331 .3127 .2804 .2277 .2600 .2874 .2888
16.092 7 .3296 .3282 .2888 .2649 .2361 .2241 .2649 .2719
19.154 1 .2754 .3345 .2733 .2684 .2480 .2445 .2684 .2565
19.154 2 .2122 .3535 .3092 .2790 .2530 .2277 .2396 .2614
19.154 3 .3260 .3232 .2818 .2649 .2347 .2291 .2326 .2565
19.154 4 .3246 .3401 .2719 .2565 .2241 .2227 .2888 .2972
19.154 5 .3078 .3197 .2853 .2670 .2326 .2326 .2431 .2494
19.154 6 .3197 .3464 .3092 .2853 .2312 .2565 .2804 .3057
19.154 7 .3366 .3366 .2874 .2670 .2445 .2312 .2494 .2754
21.173 1 .2993 .3282 .2937 .2565 .2291 .2466 .2565 .2614
21.173 2 .2171 .3436 .3127 .2790 .2326 .2361 .2171 .2516
21.173 3 .3078 .3246 .2839 .2551 .2326 .2256 .2241 .2494
21.173 4 .3246 .3296 .2839 .2614 .2256 .2206 .2804 .3043
21.173 5 .3113 .3380 .2839 .2670 .2516 .2277 .2410 .2516
21.173 6 .3176 .3401 .3043 .2804 .2206 .2530 .2818 .3057
21.173 7 .3464 .3246 .2888 .2516 .2410 .2241 .2649 .2804
24.042 1 .2719 .3162 .2888 .2530 .2375 .2480 .2600 .2649
24.042 2 .2003 .3401 .3197 .2769 .2347 .2256 .2227 .2516
24.042 3 .3211 .3246 .2839 .2698 .2326 .2326 .2227 .2431
24.042 4 .3162 .3415 .2839 .2480 .2361 .2277 .2684 .3057
24.042 5 .2958 .3331 .2888 .2698 .2396 .2326 .2312 .2516
24.042 6 .3197 .3415 .3113 .2839 .2157 .2516 .2804 .3007
24.042 7 .3317 .3197 .2853 .2649 .2347 .2192 .2494 .2635
28.292 1 .2698 .3211 .2790 .2684 .2361 .2361 .2614 .2494
28.292 2 .2038 .3380 .3022 .2733 .2361 .2227 .2277 .2494
28.292 3 .3211 .3211 .2719 .2600 .2277 .2108 .2227 .2516
28.292 4 .2972 .3246 .2769 .2516 .2256 .2192 .2754 .3007
28.292 5 .3022 .3197 .2888 .2600 .2445 .2277 .2326 .2445
28.292 6 .3211 .3401 .2958 .2698 .2157 .2431 .2719 .2853
28.292 7 .3260 .3232 .2790 .2635 .2277 .2108 .2480 .2684
31.071 1 .2769 .3113 .2888 .2551 .2312 .2361 .2565 .2649
31.071 2 .2122 .3436 .3057 .2670 .2291 .2291 .2171 .2466
31.071 3 .3127 .3043 .2733 .2600 .2312 .2241 .2157 .2396
31.071 4 .3141 .3331 .2698 .2579 .2171 .2073 .2684 .2888
31.071 5 .2993 .3127 .2853 .2530 .2241 .2171 .2326 .2410
31.071 6 .3176 .3366 .2972 .2754 .2157 .2494 .2649 .2993
31.071 7 .3345 .3141 .2769 .2614 .2277 .2108 .2530 .2600
36.052 1 .2733 .3232 .2853 .2530 .2277 .2326 .2516 .2579
36.052 2 .2157 .3380 .3127 .2684 .2206 .2227 .2108 .2480
36.052 3 .3092 .3246 .2923 .2551 .2227 .2157 .2087 .2396
36.052 4 .3141 .3317 .2733 .2551 .2157 .2157 .2818 .3007
36.052 5 .2909 .3176 .2874 .2530 .2396 .2192 .2291 .2277
36.052 6 .3162 .3282 .2888 .2649 .2073 .2410 .2754 .2958
36.052 7 .3331 .3162 .2790 .2565 .2291 .2122 .2551 .2649
38.079 1 .2600 .3162 .2769 .2551 .2347 .2396 .2530 .2516
38.079 2 .2024 .3260 .3127 .2754 .2396 .2157 .2122 .2565
38.079 3 .3127 .3260 .2804 .2516 .2241 .2192 .2024 .2361
38.079 4 .3092 .3366 .2719 .2445 .2192 .2143 .2698 .2818
38.079 5 .2993 .3176 .2754 .2649 .2256 .2206 .2291 .2431
38.079 6 .3113 .3317 .3007 .2649 .2122 .2396 .2839 .2790
38.079 7 .3162 .3366 .2719 .2551 .2227 .2171 .2466 .2635
42.073 1 .2649 .3197 .2839 .2516 .2241 .2375 .2600 .2516
42.073 2 .1989 .3331 .3043 .2754 .2361 .2122 .2192 .2312
42.073 3 .3007 .3078 .2769 .2494 .2241 .2038 .2157 .2431
42.073 4 .3141 .3331 .2790 .2431 .2073 .2038 .2698 .2818
42.073 5 .2888 .3211 .2769 .2600 .2326 .2171 .2256 .2396
42.073 6 .3113 .3317 .2993 .2649 .2073 .2410 .2719 .2993
42.073 7 .3211 .3127 .2790 .2551 .2291 .2052 .2649 .2551
45.053 1 .3197 .3331 .2839 .2494 .2291 .2466 .2480 .2480
45.053 2 .2024 .3366 .2923 .2649 .2241 .2143 .2143 .2480
45.053 3 .2431 .3092 .2804 .2466 .2192 .2122 .2192 .2277
45.053 4 .3078 .3366 .2719 .2494 .2143 .2143 .2684 .2909
45.053 5 .2888 .3043 .2804 .2600 .2312 .2157 .2227 .2396
45.053 6 .3092 .3485 .3057 .2635 .2122 .2375 .2769 .2937
45.053 7 .3331 .3141 .2698 .2565 .2291 .2073 .2410 .2516
49.050 1 .3007 .3331 .2839 .2480 .2347 .2256 .2516 .2565
49.050 2 .2052 .3401 .3057 .2733 .2277 .2192 .2122 .2466
49.050 3 .2993 .3078 .2719 .2480 .2206 .2192 .2052 .2396
49.050 4 .3092 .3246 .2670 .2480 .2087 .2073 .2769 .2937
49.050 5 .2874 .3211 .2853 .2649 .2256 .2157 .2122 .2326
49.050 6 .3092 .3246 .3022 .2635 .2024 .2326 .2839 .2972
49.050 7 .3282 .3246 .2754 .2565 .2277 .2108 .2445 .2530
53.249 1 .2923 .3331 .2839 .2494 .2241 .2361 .2445 .2445
53.249 2 .2073 .3296 .2972 .2719 .2256 .2157 .2157 .2431
53.249 3 .3043 .3127 .2839 .2516 .2157 .2073 .1989 .2241
53.249 4 .3127 .3345 .2754 .2375 .2122 .2122 .2754 .2853
53.249 5 .2958 .3078 .2754 .2551 .2157 .2192 .2227 .2326
53.249 6 .2972 .3296 .3007 .2670 .1967 .2326 .2804 .2972
53.249 7 .3162 .3296 .3127 .2790 .2635 .2206 .2052 .2516
56.052 1 .2958 .2923 .2804 .2516 .2241 .2291 .2579 .2516
56.052 2 .2024 .3331 .3022 .2600 .2241 .2192 .2157 .2396
56.052 3 .3007 .3211 .2733 .2494 .2192 .2143 .2087 .2494
56.052 4 .3092 .3232 .2818 .2375 .2192 .2087 .2719 .2888
56.052 5 .2853 .3092 .2733 .2579 .2157 .2122 .2171 .2277
56.052 6 .3092 .3331 .3057 .2516 .2087 .2375 .2719 .2839
56.052 7 .3232 .3127 .2804 .2600 .2192 .2052 .2431 .2445
59.137 1 .2804 .3282 .2874 .2516 .2241 .2396 .2466 .2410
59.137 2 .1989 .3317 .2923 .2719 .2192 .2122 .2038 .2326
59.137 3 .3007 .3043 .2733 .2445 .2171 .2024 .2052 .2361
59.137 4 .3162 .3246 .2790 .2410 .2122 .2073 .2649 .2888
59.137 5 .2888 .3246 .2790 .2396 .2157 .2087 .2171 .2291
59.137 6 .3007 .3232 .2958 .2684 .2143 .2361 .2719 .2923
59.137 7 .3092 .3296 .2754 .2516 .2256 .2052 .2073 .2480
63.075 1 .2769 .3162 .2853 .2565 .2192 .2277 .2445 .2410
63.075 2 .1918 .3232 .2972 .2684 .2256 .2227 .2087 .2445
63.075 3 .2972 .3113 .2754 .2445 .2073 .2052 .2073 .2312
63.075 4 .3057 .3246 .2684 .2396 .2122 .2052 .2698 .2937
63.075 5 .2972 .3113 .2698 .2445 .2256 .2157 .2157 .2241
63.075 6 .3022 .3345 .2888 .2551 .2087 .2241 .2614 .2958
63.075 7 .3162 .3366 .2698 .2551 .2171 .2003 .2347 .2494
66.071 1 .2649 .3260 .2769 .2445 .2171 .2291 .2551 .2361
66.071 2 .2038 .3317 .3043 .2565 .2206 .2241 .2073 .2375
66.071 3 .3092 .3092 .2769 .2445 .2227 .2024 .2073 .2277
66.071 4 .3007 .3282 .2684 .2494 .2157 .2003 .2635 .2909
66.071 5 .2818 .3176 .2804 .2466 .2277 .2073 .2143 .2347
66.071 6 .3232 .3296 .2972 .2565 .2108 .2410 .2769 .2972
66.071 7 .3246 .3162 .2754 .2480 .2052 .2073 .2480 .2445
70.046 1 .2888 .3232 .2733 .2445 .2241 .2256 .2466 .2516
70.046 2 .1989 .3127 .3092 .2684 .2192 .2038 .2122 .2480
70.046 3 .3162 .3246 .2698 .2516 .2206 .1953 .1953 .2291
70.046 4 .3092 .3260 .2719 .2361 .2143 .2003 .2649 .2909
70.046 5 .2804 .3092 .2684 .2614 .2052 .2143 .2122 .2256

70.046 6 .2909 .3380 .2993 .2565 .1953 .2277 .2754 .2769
70.046 7 .3176 .3141 .2684 .2551 .2143 .2003 .2396 .2494
73.237 1 .2684 .3331 .2790 .2445 .2192 .2291 .2494 .2396
73.237 2 .1869 .3232 .3007 .2649 .2241 .2227 .2073 .2277
73.237 3 .2993 .3246 .2909 .2516 .2143 .2087 .1989 .2256
73.237 4 .2923 .3246 .2670 .2494 .2143 .2038 .2670 .2888
73.237 5 .2804 .3232 .2769 .2396 .2206 .2052 .2157 .2206
73.237 6 .2958 .3282 .3022 .2614 .1918 .2192 .2698 .2874
73.237 7 .3092 .3162 .2733 .2530 .2122 .1953 .2565 .2445
77.048 1 .2635 .3282 .2754 .2480 .2277 .2277 .2431 .2480
77.048 2 .1932 .3197 .3022 .2579 .2227 .2087 .2171 .2326
77.048 3 .3043 .3176 .2719 .2445 .2192 .2003 .1989 .2256
77.048 4 .3043 .3232 .2684 .2396 .2073 .1989 .2649 .2888
77.048 5 .2698 .3043 .2769 .2530 .2277 .2003 .2087 .2227
77.048 6 .2972 .3282 .2937 .2614 .2024 .2256 .2670 .2923
77.048 7 .3113 .3211 .2684 .2516 .2206 .1967 .2375 .2516
80.050 1 .2614 .3211 .2719 .2565 .2206 .2206 .2466 .2480
80.050 2 .1989 .3282 .3043 .2565 .2241 .2052 .2087 .2431
80.050 3 .3022 .3113 .2790 .2480 .2122 .1967 .2087 .2277
80.050 4 .3022 .3246 .2600 .2410 .2122 .1953 .2698 .2769
80.050 5 .2839 .3113 .2719 .2494 .2192 .2122 .2073 .2206
80.050 6 .2993 .3464 .2958 .2579 .1953 .2312 .2649 .2818
80.050 7 .3127 .3211 .2698 .2445 .2256 .1932 .2516 .2494
84.050 1 .2565 .3246 .2790 .2579 .2157 .2192 .2516 .2445
84.050 2 .1883 .3246 .3043 .2551 .2157 .2122 .2038 .2396
84.050 3 .2958 .3127 .2719 .2494 .2143 .1953 .2003 .2291
84.050 4 .3022 .3211 .2649 .2410 .2073 .1967 .2649 .2839
84.050 5 .2790 .3162 .2790 .2480 .2122 .2073 .2073 .2241
84.050 6 .3007 .3176 .2923 .2635 .1932 .1953 .2192 .2698
84.050 7 .3141 .3043 .2649 .2445 .2108 .1953 .2361 .2361
87.071 1 .2614 .3331 .2684 .2410 .2143 .2277 .2480 .2410
87.071 2 .1904 .3211 .2923 .2649 .2326 .2087 .2227 .2347
87.071 3 .3092 .3113 .2804 .2480 .2052 .1918 .2038 .2122
87.071 4 .3007 .3331 .2769 .2375 .2024 .1989 .2579 .2874
87.071 5 .2937 .3127 .2839 .2516 .2192 .1967 .2052 .2277
87.071 6 .2853 .3331 .2853 .2649 .2108 .2326 .2719 .2874
87.071 7 .3127 .3211 .2649 .2516 .2192 .1932 .2312 .2466
91.071 1 .2565 .3113 .2719 .2375 .2171 .2192 .2361 .2361
91.071 2 .1848 .3345 .3007 .2565 .2192 .2108 .2024 .2277
91.071 3 .3007 .3007 .2719 .2375 .2122 .2024 .2003 .2206
91.071 4 .3092 .3197 .2649 .2312 .2038 .1918 .2649 .2839
91.071 5 .2853 .3113 .2818 .2551 .2087 .2073 .2143 .2206
91.071 6 .2888 .3232 .2923 .2600 .2073 .2171 .2600 .2888
91.071 7 .3162 .3232 .2684 .2530 .2171 .1918 .2431 .2466
95.237 1 .2551 .3022 .2769 .2410 .2192 .2192 .2375 .2410
95.237 2 .1834 .3197 .3007 .2600 .2157 .2143 .2003 .2445
95.237 3 .2993 .3127 .2769 .2410 .2038 .2003 .1967 .2227
95.237 4 .2972 .3296 .2670 .2375 .2003 .2003 .2719 .2923
95.237 5 .2769 .3141 .2769 .2494 .2171 .2003 .2143 .2122
95.237 6 .2909 .3331 .3007 .2635 .1953 .2241 .2684 .2937
95.237 7 .3141 .3127 .2754 .2494 .2038 .1904 .2410 .2445
98.237 1 .2600 .3211 .2684 .2516 .2073 .2192 .2361 .2466
98.237 2 .1869 .3260 .3127 .2649 .2241 .2143 .2003 .2326
98.237 3 .2958 .3176 .2804 .2396 .2052 .1918 .2073 .2291
98.237 4 .2937 .3260 .2670 .2375 .2038 .1932 .2565 .2804
98.237 5 .2769 .3092 .2804 .2565 .2087 .2108 .2052 .2171
98.237 6 .2769 .3260 .3057 .2635 .2003 .2171 .2635 .2888
98.237 7 .3057 .3092 .2698 .2445 .2122 .2038 .2445 .2516
101.240 1 .2565 .3127 .2733 .2516 .2206 .2227 .2410 .2277
101.240 2 .1869 .3211 .3078 .2614 .2122 .2052 .2003 .2361
101.240 3 .3057 .3057 .2754 .2516 .2087 .1989 .2003 .2326
101.240 4 .2937 .3246 .2719 .2445 .2038 .1932 .2684 .2839
101.240 5 .2719 .3162 .2818 .2516 .2192 .1932 .2003 .2108
101.240 6 .2769 .3211 .2888 .2733 .2038 .2241 .2804 .2888
101.240 7 .3043 .3260 .2754 .2530 .2256 .1918 .2375 .2480
105.071 1 .2551 .3246 .2853 .2494 .2087 .2087 .2396 .2347
105.071 2 .1848 .3296 .3007 .2579 .2122 .2052 .2087 .2410
105.071 3 .3043 .3162 .2684 .2480 .2157 .2024 .1967 .2171
105.071 4 .3043 .3366 .2614 .2312 .2073 .1989 .2551 .2769
105.071 5 .2804 .3162 .2790 .2494 .2206 .2052 .2073 .2122
105.071 6 .2923 .3260 .2972 .2754 .1967 .2171 .2579 .2839
105.071 7 .3113 .3141 .2754 .2396 .2087 .1918 .2326 .2445
108.071 1 .2516 .3296 .2754 .2445 .2122 .2157 .2375 .2410
108.071 2 .1785 .3296 .2993 .2635 .2206 .2024 .2052 .2277
108.071 3 .3092 .3078 .2733 .2361 .2073 .1904 .1953 .2206
108.071 4 .2993 .3113 .2769 .2431 .2038 .1883 .2600 .2888
108.071 5 .2733 .3162 .2754 .2480 .2157 .2024 .2157 .2157
108.071 6 .2888 .3211 .2993 .2530 .2003 .2241 .2698 .2853
108.071 7 .3043 .3176 .2649 .2410 .2024 .1883 .2312 .2410
111.779 1 .2565 .3127 .2698 .2516 .2171 .2157 .2445 .2445
111.779 2 .1869 .3211 .2958 .2516 .2122 .2087 .2024 .2347
111.779 3 .3043 .3113 .2719 .2347 .2073 .1869 .1953 .2241
111.779 4 .2839 .3232 .2670 .2361 .2024 .2024 .2698 .2804
111.779 5 .2818 .3043 .2719 .2466 .2227 .2052 .2038 .2171
111.779 6 .2804 .3282 .2888 .2614 .2003 .2241 .2684 .2719
111.779 7 .3211 .2719 .2445 .2122 .1967 .2431 .2375 .2410
121.342 1 .2494 .3078 .2733 .2396 .2052 .2087 .2466 .2445
121.342 2 .1820 .3282 .2909 .2684 .2038 .1989 .2003 .2291
121.342 3 .3162 .3141 .2769 .2361 .2052 .1918 .1932 .2192
121.342 4 .2972 .3246 .2614 .2326 .1953 .1918 .2614 .2853
121.342 5 .2818 .3197 .2804 .2516 .2052 .1918 .2038 .2157
121.342 6 .2923 .3317 .2993 .2600 .1869 .2227 .2614 .2754
121.342 7 .3043 .3078 .2614 .2480 .2073 .1869 .2361 .2241
129.237 1 .2466 .3127 .2818 .2445 .2087 .2122 .2347 .2347
129.237 2 .1714 .3211 .2888 .2670 .2108 .2108 .2003 .2241
129.237 3 .2972 .3078 .2670 .2375 .2038 .1989 .1953 .2206
129.237 4 .2909 .3296 .2649 .2530 .2052 .1883 .2530 .2853
129.237 5 .2818 .3141 .2733 .2396 .2143 .2073 .2108 .2192
129.237 6 .2719 .3211 .3007 .2754 .1967 .2171 .2733 .2853
129.237 7 .3078 .3113 .2733 .2396 .2073 .2003 .2361 .2431
136.321 1 .2516 .3260 .2719 .2291 .2087 .2143 .2312 .2396
136.321 2 .2972 .2649 .2719 .2361 .2073 .1869 .1883 .2291
136.321 3 .2972 .3197 .2649 .2361 .1953 .1918 .2614 .2853
136.321 4 .2600 .3499 .2818 .2480 .2108 .1869 .2024 .2024
136.321 5 .2804 .3127 .2670 .2445 .2192 .1932 .1989 .2122
136.321 6 .2804 .3331 .2937 .2551 .1953 .2073 .2565 .2804
136.321 7 .3078 .3113 .2670 .2466 .2143 .1883 .2326 .2347

IPM2, no-tillage volumetric water content data

TIMER	ID	N20	N40	N60	N80	N100	N120	N140	N160	N180	N200
-9.050	1	.1932	.3176	.2670	.2291	.2003	.2375	.2087	.1820	.1679	.1750
-9.050	2	.0555	.2839	.3127	.2684	.2361	.2087	.2431	.2277	.1918	.2087
-9.050	3	.1869	.3401	.2923	.2565	.2192	.2312	.1679	.1679	.1799	.1679
-9.050	4	.0337	.2530	.3162	.2614	.2431	.1918	.2649	.2579	.2108	.1729
-9.050	5	.2579	.3345	.2769	.2551	.2227	.2480	.2361	.1848	.1630	.2326
-9.050	6	.1258	.3162	.3176	.2684	.2326	.2241	.2972	.2684	.2853	.2565
-9.050	7	.2551	.3057	.2818	.2614	.2733	.3007	.2888	.2614	.2494	.2256
-8.929	1	.3535	.3162	.2670	.2347						
-8.929	2	.0625	.2923	.3162	.2635						
-8.929	3	.3520	.3450	.3022	.2635						
-8.929	4	.0794	.3022	.3197	.2649						
-8.929	5	.3535	.3317	.2937	.2600						
-8.929	6	.1546	.3246	.3162	.2649						
-8.929	7	.3380	.3450	.2937	.2649						
-8.887	1	.3450	.3260	.2733	.2396	.3211	.3211	.2670	.2684	.2614	.2291
-8.887	2	.3317	.3605	.3345	.2635	.2410	.2361	.2530	.2684	.2143	.2600
-8.887	3	.3619	.3485	.3007	.2698	.2754	.3092	.2466	.2347	.2143	.1700
-8.887	4	.3092	.3499	.3436	.2888	.2551	.2565	.2923	.2754	.2038	.1729
-8.887	5	.3535	.3246	.2818	.2579	.2993	.2972	.2516	.2466	.2087	.2326
-8.887	6	.3570	.3450	.3260	.2733	.2769	.3022	.3282	.3211	.3141	.2804
-8.887	7	.3499	.3317	.3211	.2769	.3092	.3232	.3092	.2769	.2684	.2347
-8.800	1	.3499	.3296	.2923	.2516	.3464	.3464	.2719	.2923	.2874	.2396
-8.800	2	.3584	.3415	.3282	.2902	.2516	.2698	.2839	.3141	.3127	.3366
-8.800	3	.3654	.3570	.3092	.2769	.2804	.3162	.2565	.2375	.2024	.1883
-8.800	4	.3570	.3366	.3535	.3007	.2480	.2972	.3141	.2972	.2790	.1729
-8.800	5	.3520	.3380	.2972	.2754	.2888	.2888	.2579	.2312	.2038	.2361
-8.800	6	.3809	.3450	.3366	.3022	.3092	.3724	.3640	.3485	.3366	.2958
-8.800	7	.3535	.3415	.3211	.3197	.3246	.3162	.3113	.2600	.2530	.2277
-8.708	1	.3773	.3380	.3007	.2818	.3464	.3619	.2972	.3141	.2923	.2445
-8.708	2	.3689	.3570	.3246	.2972	.2754	.2937	.2818	.3127	.3007	.3197
-8.708	3	.3738	.3556	.3162	.2698	.2902	.3092	.2277	.2227	.1989	.1700
-8.708	4	.3689	.3464	.3415	.3113	.2719	.2790	.3057	.2874	.2565	.1820
-8.708	5	.3584	.3380	.2902	.2733	.3141	.2888	.2445	.2361	.2003	.2347
-8.708	6	.3773	.3535	.3317	.3127	.3246	.4047	.3942	.3485	.3401	.2888
-8.708	7	.3809	.3464	.3317	.3176	.3366	.3345	.3092	.2972	.2818	.2530
-8.512	1	.3436	.3296	.2972	.2853	.3640	.3823	.3232	.3197	.3141	.2396
-8.512	2	.3619	.3654	.3296	.3007	.2888	.3007	.2923	.3211	.2839	.3022
-8.512	3	.3668	.3570	.3141	.2853	.2937	.3078	.2227	.2108	.2003	.1714
-8.512	4	.3809	.3605	.3366	.3127	.2790	.2769	.3007	.2769	.2516	.1834
-8.512	5	.3450	.3464	.3043	.2888	.2853	.2902	.2565	.2157	.1967	.2361
-8.512	6	.3738	.3605	.3401	.3162	.3246	.4132	.3823	.3619	.3436	.2923
-8.512	7	.3773	.3436	.3331	.3232	.3485	.3499	.3078	.2818	.2579	.2410
-8.125	1	.3535	.3401	.3141	.3057	.3759	.3928	.3296	.3415	.3092	.2579
-8.125	2	.3773	.3689	.3282	.3162	.3078	.3141	.3092	.3485	.2923	.2937
-8.125	3	.3844	.3499	.3197	.3113	.3007	.3043	.2206	.2003	.2024	.1679
-8.125	4	.3773	.3619	.3464	.3246	.2888	.2719	.3022	.2874	.2347	.1729
-8.125	5	.3640	.3464	.3113	.2972	.3007	.3078	.2579	.2143	.1869	.2291
-8.125	6	.3809	.3570	.3296	.3246	.3331	.3907	.3928	.3738	.3703	.3113
-8.125	7	.3773	.3499	.3282	.3296	.3584	.3640	.3092	.2972	.2769	.2361
-7.829	1	.3619	.3401	.3113	.3197	.3654	.4012	.3366	.3296	.3141	.2466
-7.829	2	.3738	.3668	.3401	.3078	.3127	.3211	.3331	.3260	.2804	.2853
-7.829	3	.3809	.3535	.3211	.3092	.3092	.3007	.2277	.2038	.2024	.1764
-7.829	4	.3787	.3668	.3485	.3380	.3057	.2769	.3113	.2874	.2256	.1764
-7.829	5	.3689	.3485	.3162	.2937	.3022	.3211	.2684	.2227	.1953	.2396
-7.829	6	.3738	.3668	.3380	.3092	.3436	.3738	.3844	.3689	.3759	.3078
-7.829	7	.3907	.3570	.3331	.3260	.3570	.3738	.3345	.3296	.2993	.2361
-7.512	1	.3654	.3331	.3043	.3092	.3703	.4132	.3246	.3401	.3141	.2494
-7.512	2	.3654	.3703	.3450	.3176	.3092	.3246	.3260	.3282	.2804	.2958
-7.512	3	.3668	.3619	.3260	.3162	.3141	.3057	.2038	.2024	.2073	.1714
-7.512	4	.3738	.3570	.3401	.3211	.3057	.2888	.3296	.2818	.2375	.1785
-7.512	5	.3535	.3584	.3127	.3092	.3078	.3127	.2818	.2241	.1883	.2410
-7.512	6	.3858	.3520	.3415	.3127	.3260	.3773	.3942	.3724	.3787	.3197
-7.512	7	.3759	.3485	.3211	.3211	.3556	.3773	.3366	.3345	.3022	.2466
-7.083	1	.3654	.3450	.3232	.3211	.3879	.4012	.3436	.3464	.3127	.2733
-7.083	2	.3928	.3703	.3415	.3162	.3113	.3380	.3331	.3296	.2769	.2874
-7.083	3	.3809	.3619	.3176	.3141	.3176	.3246	.2277	.2024	.2052	.1644
-7.083	4	.3668	.3689	.3485	.3317	.3141	.3092	.3380	.3022	.2466	.1834
-7.083	5	.3654	.3535	.3296	.3113	.3176	.3211	.2923	.2396	.1883	.2291
-7.083	6	.3858	.3584	.3380	.3113	.3366	.3773	.3942	.3759	.3907	.3331
-7.083	7	.3787	.3668	.3317	.3366	.3619	.3823	.3436	.3556	.3331	.2902
-6.715	1	.3787	.3450	.3197	.3043	.3893	.3977	.3450	.3401	.2993	.2600
-6.715	2	.3823	.3858	.3436	.3197	.3162	.3366	.3450	.3415	.2719	.3022
-6.715	3	.3759	.3654	.3246	.3162	.3057	.3296	.2410	.2073	.2087	.1750
-6.715	4	.3879	.3619	.3450	.3331	.3092	.3022	.3535	.3246	.2516	.1799
-6.715	5	.3556	.3436	.3232	.3127	.3211	.3162	.2923	.2396	.1883	.2347
-6.715	6	.3893	.3570	.3401	.3260	.3331	.3858	.3907	.3703	.3907	.3366
-6.715	7	.3809	.3668	.3345	.3211	.3570	.3844	.3436	.3535	.3366	.3022
-6.548	1	.3738	.3450	.3007	.3260	.4097	.4062	.3345	.3436	.3092	.2684
-6.548	2	.3773	.3689	.3380	.3113	.3162	.3345	.3450	.3296	.2670	.2923
-6.548	3	.3738	.3654	.3260	.3113	.3043	.3401	.2347	.2108	.2122	.1785
-6.548	4	.3759	.3759	.3499	.3246	.3022	.3127	.3570	.3127	.2600	.1869
-6.548	5	.3759	.3640	.3211	.3176	.3092	.3260	.2972	.2410	.1953	.2431
-6.548	6	.3893	.3703	.3450	.2993	.3366	.3668	.3991	.3858	.3724	.3366
-6.548	7	.3942	.3605	.3401	.3246	.3535	.3858	.3366	.3499	.3450	.3007
-6.090	1	.3654	.3535	.3162	.3162	.3942	.4132	.3380	.3535	.3197	.2818
-6.090	2	.3809	.3907	.3485	.3162	.3113	.3317	.3499	.3331	.2769	.2972
-6.090	3	.3823	.3619	.3296	.3197	.3127	.3415	.2733	.2347	.2157	.1834
-6.090	4	.3879	.3668	.3570	.3211	.3162	.3141	.3619	.3450	.2804	.2003
-6.090	5	.3724	.3450	.3057	.3141	.3078	.3331	.2993	.2565	.2108	.2516
-6.090	6	.3809	.3668	.3296	.3246	.3345	.3773	.3942	.3787	.3942	.3380
-6.090	7	.3893	.3619	.3296	.3296	.3499	.3738	.3485	.3464	.3380	.3176
-5.840	1	.3689	.3520	.3197	.3176	.3991	.4146	.3464	.3450	.3141	.2839
-5.840	2	.3738	.3703	.3464	.3162	.3127	.3331	.3464	.3401	.2684	.3127
-5.840	3	.3893	.3640	.3246	.3141	.3092	.3282	.2530	.2410	.2241	.1848
-5.840	4	.3823	.3738	.3654	.3197	.3092	.3162	.3605	.3380	.2937	.2108
-5.840	5	.3654	.3485	.3197	.3162	.3246	.3331	.3043	.2684	.2157	.2600
-5.840	6	.3809	.3640	.3535	.3380	.3331	.3858	.4012	.3809	.3977	.3380
-5.840	7	.3858	.3535	.3331	.3317	.3654	.3844	.3485	.3556	.3450	.3113
-5.554	1	.3619	.3520	.3127	.3162	.4062	.4012	.3499	.3415	.3176	.2804
-5.554	2	.3759	.3738	.3485	.3162	.3197	.3296	.3401	.3380	.2923	.3141
-5.554	3	.4062	.3619	.3317	.3078	.3317	.3380	.2600	.2445	.2579	.1834
-5.554	4	.3823	.3654	.3499	.3246	.3162	.3197	.3605	.3345	.2888	.2347
-5.554	5	.3689	.3464	.3141	.3078	.3197	.3464	.3092	.2719	.2256	.2818
-5.554	6	.3928	.3619	.3436	.3317	.3401	.3668	.3809	.3619	.3858	.3485
-5.554	7	.3844	.3535	.3317	.3317	.3724	.3823	.3380	.3654	.3345	.3282
-4.708	1	.3738	.3520	.3092	.3232	.4097	.4146	.3520	.3450	.3211	.2958
-4.708	2	.3942	.3773	.3331	.3127	.3366	.3331	.3570	.3464	.2818	.3366
-4.708	3	.3907	.3654	.3296	.3127	.3176	.3401	.2614	.2551	.2839	.2445
-4.708	4	.3858	.3759	.3485	.3345	.3176	.3092	.3619	.3464	.3057	.2719
-4.708	5	.3668	.3450	.3246	.3127	.3113	.3331	.3211	.2902	.2579	.3113
-4.708	6	.3907	.3738	.3415	.3162	.3436	.3605	.3823	.3570	.3893	.3499
-4.708	7	.3907	.3584	.3331	.3246	.3689	.3809	.3535	.3619	.3556	.3232
-4.042	1	.3738	.3499	.3092	.3260	.4167	.4146	.3485	.3499	.3176	.3127
-4.042	2	.3759	.3773	.3520	.3211	.3162	.3331	.3520	.3464	.2839	.3499

-4.042 3 .3977 .3520 .3296 .3232 .3197 .3556 .2698 .2839 .2937 .2719
-4.042 4 .3844 .3689 .3464 .3331 .3162 .3893 .3619 .3436 .3127 .2839
-4.042 5 .3668 .3570 .3296 .2993 .3246 .3415 .3092 .2818 .2769 .3078
-4.042 6 .3893 .3535 .3499 .3176 .3345 .3759 .3963 .3654 .3858 .3485
-4.042 7 .3858 .3605 .3176 .3366 .3640 .3787 .3570 .3450 .3584 .3282
-3.804 1 .3823 .3520 .3127 .3260 .4083 .4132 .3401 .3570 .3331 .2972
-3.804 2 .3703 .3844 .3520 .3260 .3092 .3415 .3464 .3436 .2937 .3520
-3.804 3 .3942 .3619 .3232 .3162 .3113 .3317 .2649 .2733 .2937 .2804
-3.804 4 .3787 .3703 .3520 .3345 .3078 .3703 .3401 .3141 .2923 .3668
-3.804 5 .3619 .3535 .3317 .3007 .3211 .3415 .3162 .2839 .2614 .3211
-3.804 6 .3809 .3724 .3450 .3211 .3317 .2579 .3057 .2972 .2649 .2818
-3.804 7 .3415 .3450 .2754 .3317 .3619 .3787 .3535 .3654 .3535 .3331
-2.449 1 .3703 .3605 .3127 .3366 .4181 .4111 .3556 .3535 .3331 .3092
-2.449 2 .3858 .3738 .3450 .3331 .3211 .3345 .3485 .3464 .2839 .3464
-2.449 3 .3724 .3619 .3127 .3127 .3141 .3366 .2818 .2804 .3007 .3113
-2.449 4 .3738 .3724 .3499 .3282 .3176 .3282 .3535 .3520 .3211 .2958
-2.449 5 .3809 .3809 .3450 .3197 .3380 .3317 .3464 .3963 .3654 .3485
-2.449 6 .3879 .3654 .3485 .3197 .3232 .3654 .3809 .3556 .3809 .3366
-2.449 7 .3823 .3605 .3282 .3246 .3605 .3844 .3485 .3570 .3415 .3232
-2.030 1 .3787 .3605 .3141 .3520 .4012 .4167 .3415 .3415 .3282 .3057
-2.030 2 .3879 .3823 .3366 .3296 .3162 .3197 .3415 .3485 .2972 .3535
-2.030 3 .3977 .3738 .3127 .3211 .3345 .2684 .2684 .2818 .3007 .2993
-2.030 4 .3689 .3640 .3535 .3197 .3738 .3211 .3668 .3415 .3127 .2902
-2.030 5 .3928 .3689 .3499 .3078 .3282 .3520 .3928 .3556 .3858 .3450
-2.030 6 .4026 .3668 .3450 .3738 .3963 .3640 .3773 .3619 .3724 .3296
-2.030 7 .3619 .3668 .3366 .3260 .3605 .3738 .3520 .3556 .3415 .3331
-1.048 1 .3759 .3640 .3331 .3654 .4216 .4146 .3464 .3401 .3211 .3007
-1.048 2 .3907 .3738 .3366 .3092 .3246 .3296 .3401 .3366 .2839 .3464
-1.048 3 .3858 .3584 .3260 .3197 .3211 .3415 .2670 .2769 .3113 .3057
-1.048 4 .3738 .3689 .3556 .3317 .3078 .3162 .3535 .3331 .3197 .2993
-1.048 5 .3654 .3619 .3246 .3007 .3057 .3345 .3092 .2874 .2804 .3176
-1.048 6 .3738 .3759 .3520 .3162 .3232 .3640 .3893 .3759 .3823 .3450
-1.048 7 .3858 .3668 .3380 .3345 .3619 .3844 .3535 .3584 .3535 .3246
0.000 1 .3738 .3640 .3773 .3759 .4132 .4097 .3535 .3535 .3366 .3127
0.000 2 .3893 .3823 .3464 .3211 .3113 .3246 .3436 .3366 .2923 .3520
0.000 3 .3977 .3668 .3331 .3176 .3232 .3366 .2649 .2733 .3141 .3127
0.000 4 .3759 .3703 .3605 .3211 .2993 .3113 .3619 .3401 .3331 .2993
0.000 5 .3773 .3499 .3260 .3043 .3162 .3366 .3078 .2790 .2804 .3211
0.000 6 .3759 .3570 .3605 .3317 .3415 .3858 .3942 .3738 .3759 .3401
0.000 7 .3809 .3584 .3331 .3331 .3535 .3668 .3450 .3605 .3499 .3331
0.154 1 .3724 .3619 .3724 .3619 .4111 .4132 .3619 .3464 .3176 .3078
0.154 2 .3858 .3773 .3499 .3211 .3043 .3366 .3345 .3296 .2888 .3450
0.154 3 .3928 .3584 .3317 .3211 .3197 .3436 .2649 .2698 .3127 .3057
0.154 4 .4047 .3738 .3520 .3331 .3141 .3197 .3787 .3345 .3162 .2902
0.154 5 .3520 .3668 .3282 .3092 .3057 .3415 .3057 .2719 .2888 .3345
0.154 6 .3893 .3689 .3584 .3246 .3380 .3668 .3879 .3689 .3738 .3535
0.154 7 .3450 .3464 .3331 .3436 .3619 .3759 .3654 .3668 .3535 .3260
0.250 1 .3668 .3605 .3689 .3654 .4062 .4132 .3535 .3584 .3260 .3141
0.250 2 .3963 .3809 .3485 .3211 .3246 .3296 .3436 .3366 .2839 .3450
0.250 3 .3823 .3619 .3246 .3057 .3162 .3366 .2698 .2839 .3043 .3092
0.250 4 .3907 .3759 .3584 .3345 .3127 .3078 .3605 .3296 .3162 .3043
0.250 5 .3619 .3436 .3246 .3162 .3232 .3464 .3092 .3007 .2754 .3246
0.250 6 . . . . . .
0.250 7 . . . . . .
0.446 1 .3619 .3535 .3127 .3176 .3520 .3928 .3436 .3535 .3246 .2923
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0.446 3 .3738 .3724 .3331 .3092 .3176 .3401 .2600 .2818 .3007 .3113
0.446 4 .3977 .3654 .3485 .3345 .3127 .3197 .3605 .3345 .3092 .2888
0.446 5 .3640 .3535 .3282 .3057 .3127 .3450 .3022 .2839 .2804 .3211
0.446 6 .3928 .3738 .3485 .3211 .3162 .3436 .3844 .3535 .3787 .3415
0.446 7 .3296 .3605 .3331 .3317 .3520 .3823 .3556 .3499 .3556 .3296
1.029 1 .3556 .3436 .3007 .3176 .3296 .3584 .3176 .3176 .3197 .3127
1.029 2 .3773 .3738 .3436 .3113 .3113 .3211 .3366 .3485 .2902 .3401
1.029 3 .3738 .3619 .3232 .3092 .3007 .3260 .2733 .2684 .3092 .3043
1.029 4 .3619 .3654 .3584 .3211 .3092 .3078 .3485 .3296 .3022 .3022
1.029 5 .3619 .3485 .3113 .3007 .3141 .3331 .3127 .2839 .2790 .3296
1.029 6 .3570 .3654 .3401 .3162 .3127 .3520 .3689 .3584 .3773 .3366
1.029 7 .3176 .3520 .3246 .3092 .3485 .3640 .3535 .3450 .3401 .3296
1.196 1 .3570 .3499 .3092 .3092 .3246 .3570 .3211 .3282 .3211 .2888
1.196 2 .3942 .3668 .3415 .3127 .3162 .3162 .3401 .3450 .2733 .3556
1.196 3 .3724 .3654 .3246 .3022 .3092 .3366 .2719 .2790 .3127 .3007
1.196 4 .3535 .3570 .3464 .3211 .3007 .3078 .3689 .3380 .3092 .2874
1.196 5 .3520 .3535 .3232 .2993 .3127 .3260 .3043 .2888 .2754 .3232
1.196 6 .3520 .3668 .3436 .3022 .3043 .3366 .3724 .3640 .3668 .3380
1.196 7 .3246 .3619 .3232 .3211 .3415 .3668 .3464 .3485 .3415 .3232
1.995 1 .3366 .3584 .3092 .3022 .3162 .3584 .3176 .3162 .3260 .2993
1.995 2 .3724 .3809 .3485 .3127 .3078 .3296 .3450 .3366 .2902 .3535
1.995 3 .3535 .3759 .3176 .3113 .3007 .3141 .2516 .2649 .3007 .3022
1.995 4 .3485 .3654 .3499 .3282 .3007 .3007 .3401 .3401 .3043 .2888
1.995 5 .3605 .3485 .3197 .2972 .2902 .3127 .3022 .2818 .2600 .3296
1.995 6 .3485 .3605 .3141 .2888 .2937 .3197 .3043 .2839 .2684 .3127
1.995 7 .3162 .3703 .3296 .3127 .3450 .3640 .3366 .3366 .3415 .3127
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2.249 7 .3689 .3296 .2972 .3619 .3331 .3141 .3331 .3535 .3415 .3415
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2.994 3 .3401 .3535 .3296 .2958 .2972 .3260 .2396 .2494 .3092 .3043
2.994 4 .2972 .3619 .3415 .3260 .2993 .2853 .3464 .3331 .3535 .2818
2.994 5 .3605 .3556 .3113 .3057 .2958 .3232 .3022 .2804 .2684 .3296
2.994 6 .2874 .3724 .3436 .3057 .2972 .3043 .3605 .3450 .3605 .3331
2.994 7 .3043 .3654 .3260 .3162 .3211 .3520 .3401 .3317 .3331 .3127
3.253 1 .3450 .3415 .2972 .2958 .2923 .3485 .3127 .3141 .3078 .3057
3.253 2 .3176 .3689 .3401 .3092 .2993 .2937 .3282 .3415 .2853 .3619
3.253 3 .3366 .3535 .3232 .3022 .2888 .3197 .2516 .2635 .3007 .2937
3.253 4 .3141 .3584 .3485 .3141 .2839 .2902 .3436 .3246 .2923 .2790
3.253 5 .3619 .3556 .3113 .2993 .2972 .3246 .2972 .2754 .2579 .3211
3.253 6 .3127 .3570 .3415 .2958 .2958 .2972 .3450 .3499 .3556 .3317
3.253 7 .2839 .3556 .3246 .3092 .3317 .3415 .3232 .3246 .3436 .3127
3.987 1 .3260 .3415 .2902 .3007 .2972 .3499 .3162 .3246 .3127 .3078
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3.987 3 .3296 .3689 .3211 .3113 .2888 .3127 .2494 .2516 .3043 .2923
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4.250 1 .3415 .3415 .3078 .2888 .2993 .3317 .3092 .3092 .3022 .2937
4.250 2 .3556 .3619 .3415 .3043 .3007 .3043 .3296 .3260 .2818 .3499
4.250 3 .3415 .3570 .3246 .3127 .2923 .3113 .2445 .2635 .3043 .2923
4.250 4 .2923 .3570 .3535 .3092 .2874 .2839 .3415 .3246 .2874 .2579
4.250 5 .3619 .3415 .3141 .2902 .2804 .3197 .2888 .2719 .2480 .3176
4.250 6 .3092 .3570 .3380 .2888 .2853 .2923 .3570 .3535 .3485 .3246
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4.987 2 .3127 .3773 .3415 .3141 .2902 .2839 .3246 .3260 .2769 .3366
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4.987 7 .2888 .3450 .3197 .3022 .3141 .3485 .3246 .3296 .3127 .3078
5.247 1 .3260 .3401 .3043 .2888 .2937 .3380 .3092 .3113 .3022 .3007
5.247 2 .3057 .3317 .3113 .2902 .2923 .3197 .3260 .3759 .2754 .3401
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5.247 4 .2790 .3485 .3415 .2993 .2874 .2733 .3296 .3162 .2853 .2684
5.247 5 .3570 .3401 .3176 .2888 .2754 .3092 .2874 .2719 .2480 .3162
5.247 6 .2937 .3759 .3485 .2993 .2839 .2888 .3436 .3331 .3584 .3317
5.247 7 .2818 .3556 .3022 .3232 .3485 .3331 .3232 .3232 .3211 .3007
8.300 1 .3260 .3415 .2993 .2684 .2804 .3260 .3007 .3078 .2902 .2972
8.300 2 .3057 .3464 .3345 .2972 .2853 .2769 .3127 .3127 .2902 .3366
8.300 3 .3296 .3584 .3232 .2958 .2790 .3007 .2312 .2431 .2818 .2923

8.300 4 .2649 .3570 .3485 .3092 .2818 .2698 .3232 .3162 .2902 .2565
8.300 5 .3464 .3366 .3057 .2923 .2769 .3092 .2719 .2670 .2445 .3092
8.300 6 .2874 .3738 .3345 .2972 .2719 .2853 .3345 .3246 .3380 .3317
8.300 7 .2818 .3415 .3113 .3043 .2972 .3296 .3246 .3246 .3197 .2923
8.970 1 .3176 .3380 .3007 .2804 .2902 .3345 .3007 .3078 .2937 .2790
8.970 2 .3043 .3703 .3366 .3007 .2958 .2874 .3078 .3197 .2754 .3331
8.970 3 .3162 .3535 .3078 .2937 .2754 .2958 .2256 .2445 .2818 .2818
8.970 4 .2635 .3520 .3520 .3162 .2754 .2579 .3260 .3007 .2804 .2635
8.970 5 .3450 .3450 .2993 .2818 .2635 .3022 .2733 .2579 .2347 .3162
8.970 6 .2804 .3520 .3211 .2923 .2769 .2804 .3366 .3260 .3464 .3022
8.970 7 .2649 .3535 .3232 .2972 .3141 .3331 .3078 .3176 .3092 .2853
9.988 1 .3057 .3450 .2818 .2769 .2839 .3380 .2853 .3043 .2853 .2923
9.988 2 .2853 .3724 .3331 .3007 .2804 .2888 .3246 .3260 .2649 .3401
9.988 3 .3211 .3605 .3197 .2902 .2804 .2972 .2256 .2396 .2769 .2839
9.988 4 .2635 .3619 .3401 .3043 .2790 .2649 .3260 .3092 .2888 .2579
9.988 5 .3499 .3436 .3043 .2818 .2635 .2937 .2733 .2565 .2375 .3113
9.988 6 .2769 .3654 .3366 .2769 .2516 .2733 .3380 .3282 .3464 .3162
9.988 7 .2790 .3401 .3211 .2923 .2993 .3282 .3092 .3176 .3092 .2874
11.042 1 .3345 .3520 .3007 .2769 .2790 .3162 .2923 .3022 .2937 .2769
11.042 2 .2888 .3584 .3246 .2958 .2754 .2769 .3141 .3043 .2670 .3436
11.042 3 .3246 .3535 .3007 .2888 .2684 .2972 .2241 .2361 .2769 .2839
11.042 4 .2431 .3605 .3485 .3127 .2888 .2600 .3232 .3007 .2733 .2516
11.042 5 .3499 .3436 .3078 .2670 .2649 .2888 .2733 .2600 .2361 .3127
11.042 6 .2874 .3584 .3246 .2853 .2614 .2754 .3282 .3282 .3415 .3127
11.042 7 .2719 .3520 .3197 .2923 .2972 .3366 .3232 .3176 .3211 .2733
11.969 1 .3113 .3380 .2972 .2818 .2754 .3246 .2923 .2958 .2937 .2769
11.969 2 .2818 .3570 .3366 .2972 .2804 .2839 .3113 .3211 .2649 .3366
11.969 3 .3127 .3570 .3162 .2853 .2684 .2993 .2227 .2445 .2818 .2790
11.969 4 .2494 .3450 .3436 .3078 .2698 .2516 .3232 .2993 .2698 .2516
11.969 5 .3499 .3436 .3007 .2769 .2600 .2888 .2670 .2445 .2312 .3092
11.969 6 .2769 .3556 .3366 .2923 .2516 .2733 .3380 .3366 .3331 .3162
11.969 7 .2698 .3450 .3162 .2923 .2972 .3232 .3232 .3162 .3127 .2839
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16.042 3 .3078 .3436 .3043 .2804 .2565 .2888 .2157 .2361 .2684 .2733
16.042 4 .2466 .3535 .3401 .2923 .2614 .2600 .3176 .3022 .2649 .2396
16.042 5 .3345 .3380 .3007 .2600 .2565 .3007 .2600 .2396 .2277 .3022
16.042 6 .2684 .3450 .3211 .2754 .2579 .2649 .3092 .3260 .3296 .3113
16.042 7 .2684 .3450 .2972 .2818 .2993 .3260 .3246 .3057 .3007 .2853
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16.966 2 .2790 .3605 .3331 .2839 .2853 .2649 .3113 .3078 .2516 .3162
16.966 3 .3092 .3584 .3127 .2888 .2565 .2818 .2143 .2277 .2614 .2614
16.966 4 .2516 .3366 .3366 .2888 .2719 .2410 .3211 .2923 .2670 .2410
16.966 5 .3296 .3415 .2902 .2635 .2565 .2853 .2600 .2361 .2277 .3092
16.966 6 .2698 .3535 .3296 .2804 .2579 .2684 .3331 .3260 .3232 .3022
16.966 7 .2733 .3401 .3057 .2902 .2902 .3162 .3092 .3057 .3127 .2804
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19.246 4 .2445 .3415 .3415 .2923 .2698 .2375 .3141 .3022 .2579 .2431
19.246 5 .3331 .3331 .2993 .2684 .2494 .2769 .2494 .2326 .2157 .3022
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19.246 7 .2670 .3464 .3078 .2923 .2937 .3113 .3162 .2923 .3057 .2684
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22.045 7 .2614 .3415 .2993 .2902 .2769 .3141 .3127 .2902 .3022 .2769
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25.991 3 .2839 .3485 .3043 .2769 .2565 .2719 .2143 .2312 .2579 .2684
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25.991 5 .3415 .3415 .2888 .2649 .2396 .2790 .2565 .2410 .2108 .2972
25.991 6 .2600 .3556 .3331 .2818 .2445 .2551 .3176 .3092 .3162 .2993
25.991 7 .2698 .3401 .3141 .2839 .2923 .3197 .3162 .3007 .2902 .2600
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29.006 2 .2684 .3556 .3162 .2923 .2719 .2600 .3043 .2937 .2516 .3176
29.006 3 .3127 .3535 .3043 .2839 .2480 .2769 .2087 .2291 .2684 .2565
29.006 4 .2396 .3520 .3345 .2804 .2600 .2227 .3043 .2958 .2516 .2291
29.006 5 .3415 .3380 .2790 .2649 .2410 .2818 .2516 .2396 .2157 .2972
29.006 6 .2565 .3570 .3331 .2733 .2516 .2480 .3127 .3057 .3260 .3007
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33.208 6 .2649 .3450 .3176 .2804 .2516 .2466 .3092 .3092 .3162 .3007
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36.038 4 .2326 .3415 .3246 .2888 .2649 .2291 .3043 .2923 .2480 .2361
36.038 5 .3415 .3380 .2958 .2494 .2396 .2733 .2410 .2431 .2143 .2972
36.038 6 .2410 .3499 .3331 .2853 .2480 .2445 .3092 .3057 .3113 .2972
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37.968 3 .3141 .3605 .3007 .2888 .2445 .2649 .2038 .2241 .2733 .2649
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39.995 5 .3317 .3499 .2923 .2565 .2312 .2733 .2396 .2410 .2171 .2958
39.995 6 .2516 .3450 .3162 .2684 .2958 .2480 .3092 .3162 .3078 .2923
39.995 7 .2530 .3485 .3022 .2754 .2874 .3176 .2972 .2888 .2937 .2600
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43.053 4 .2227 .3317 .3260 .2804 .2551 .2291 .3113 .2839 .2670 .2347

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54.154 4 .2227 .3401 .3317 .2818 .2516 .2241 .3078 .2839 .2565 .2277
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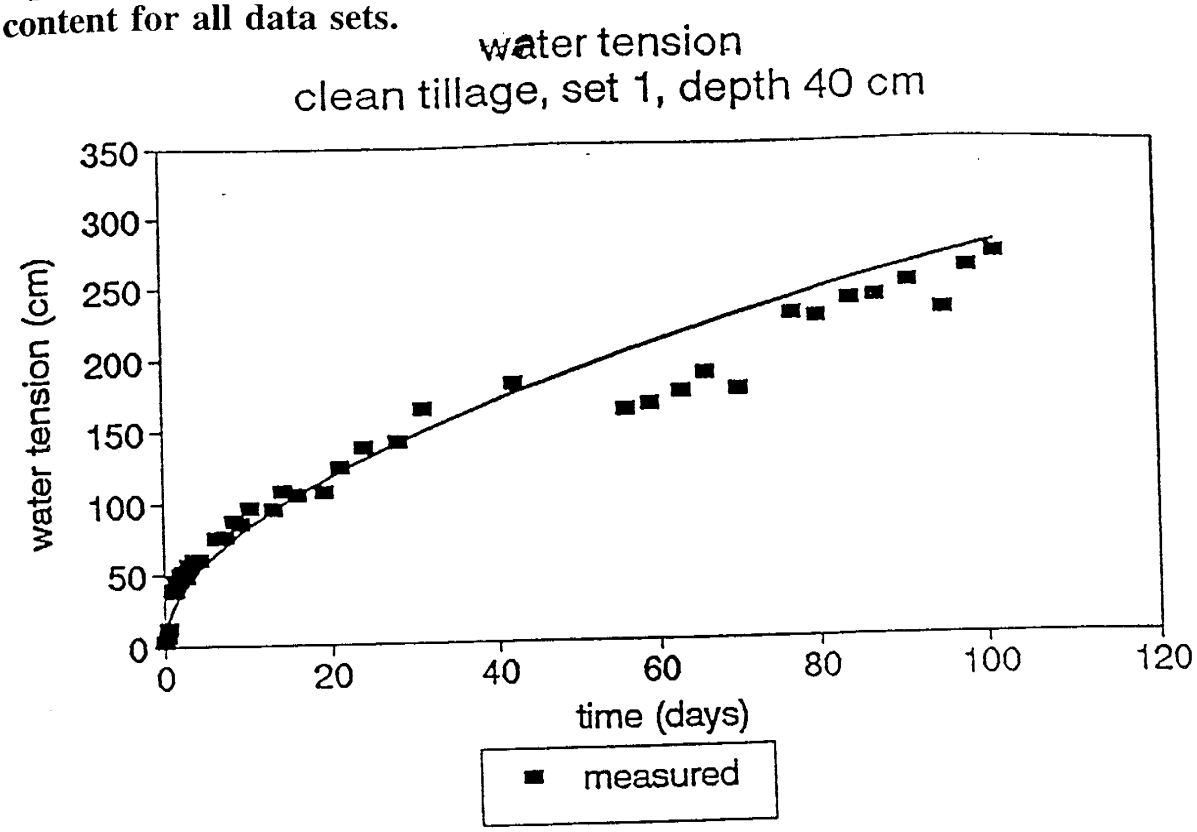
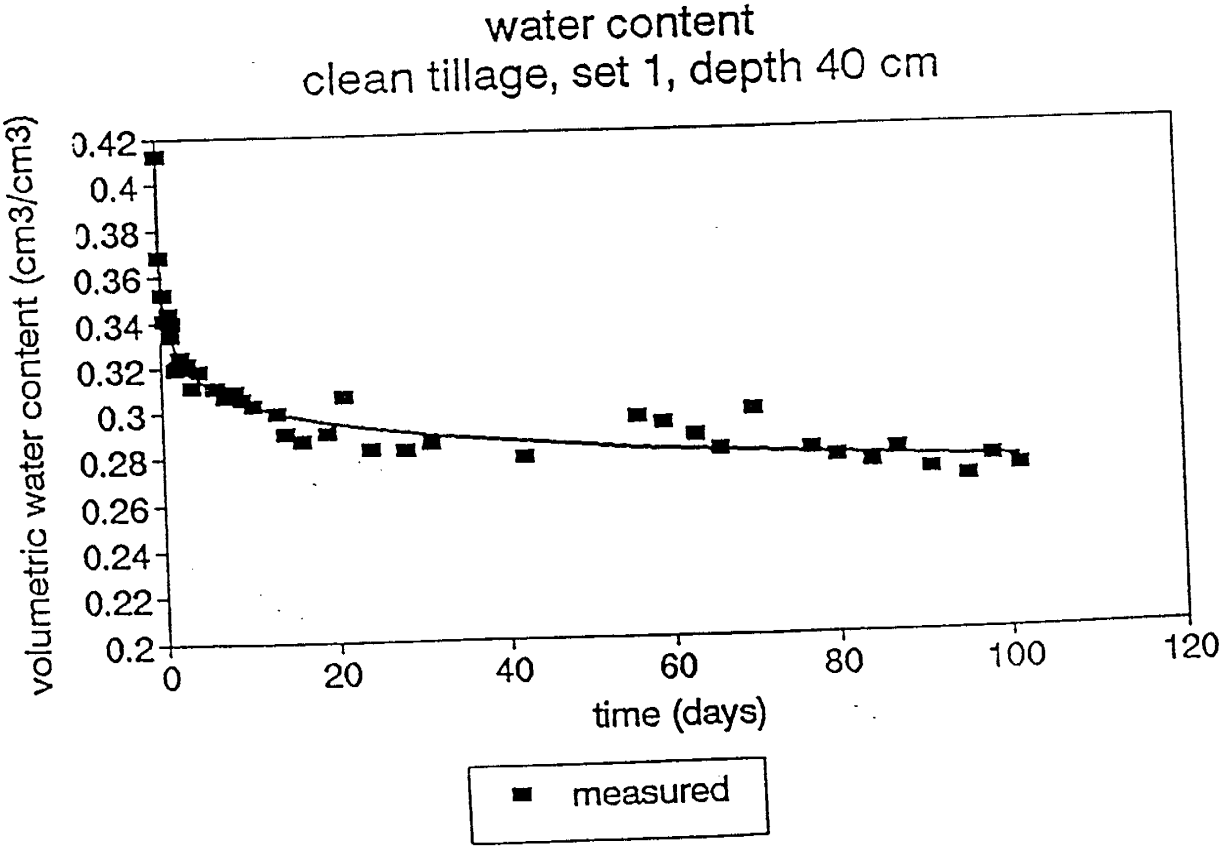
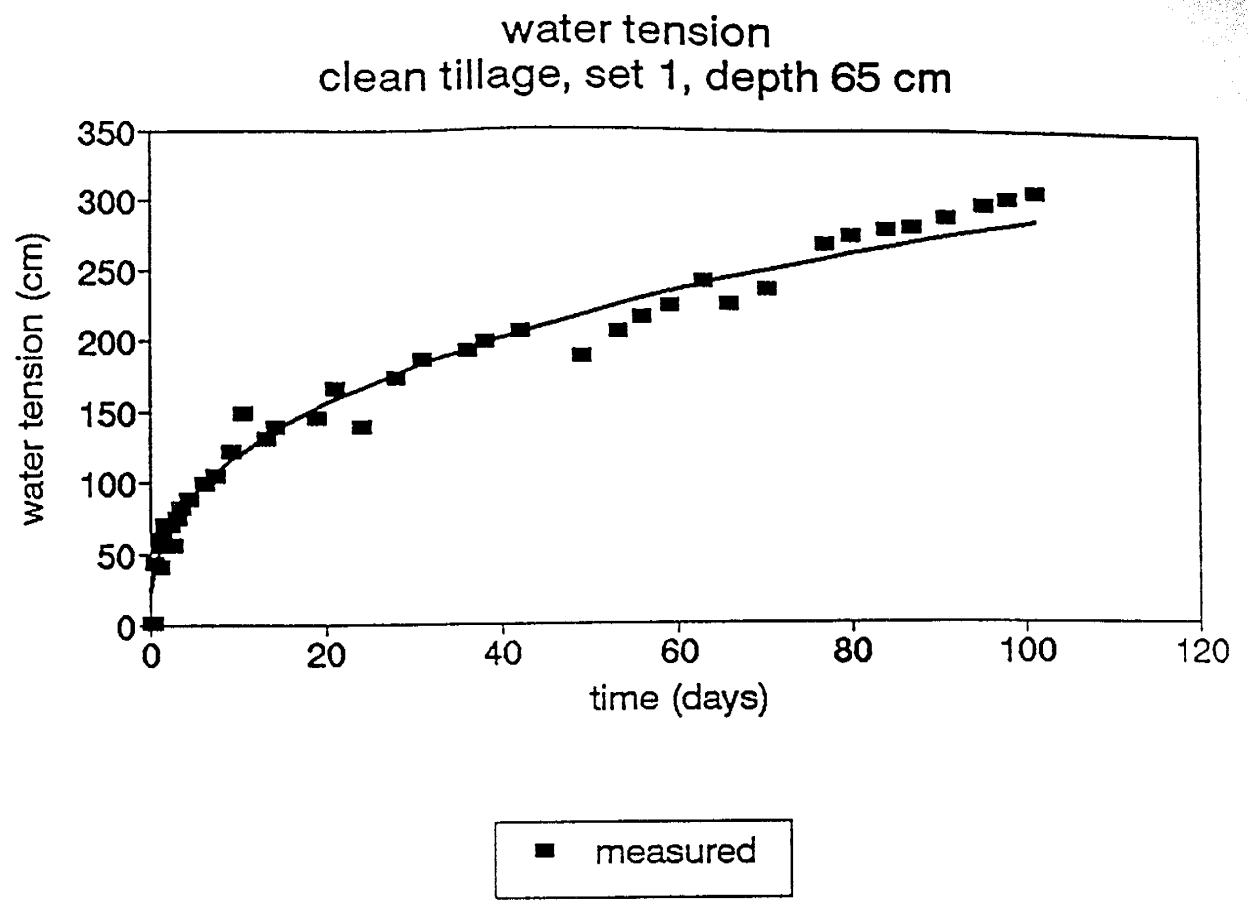
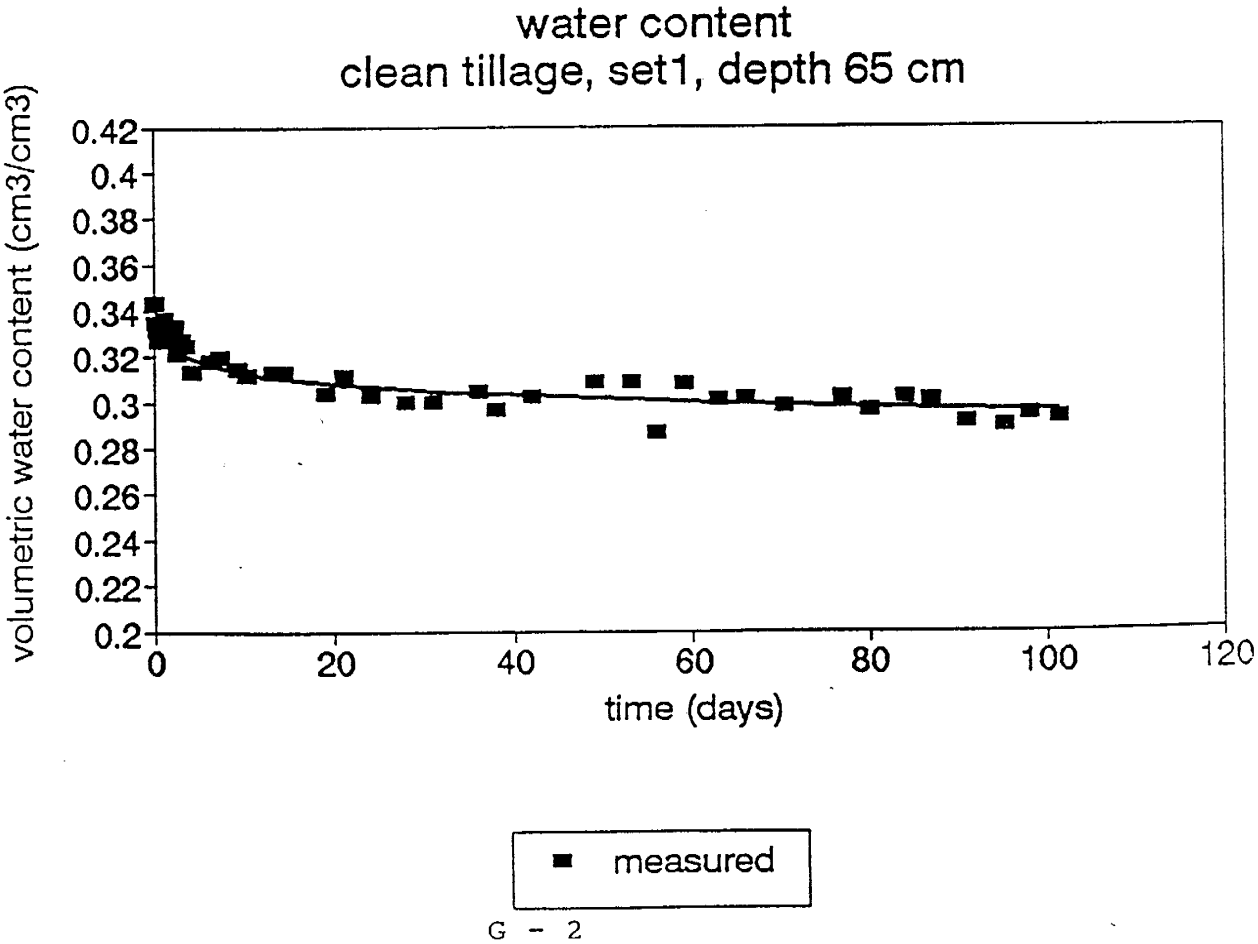
109.154 7 .3450 .3380 .2958 .2719 .2684 .3043 .2972 .2754 .2839 .263
116.217 1 .2769 .3197 .3345 .2804 .2565 .2431 .2937 .2614 .2565 .260(
116.217 2 .2698 .2790 .3211 .2733 .2565 .2431 .2972 .2698 .2445 .312
116.217 3 .2923 .3282 .2972 .2614 .2326 .2649 .2087 .2347 .2431 .244
116.217 4 .2038 .3380 .3211 .2839 .2516 .2241 .3043 .2719 .2396 .203
116.217 5 .3535 .3317 .2937 .2565 .2347 .2649 .2375 .2038 .2003 .275
116.217 6 .2466 .3436 .3092 .2684 .2312 .2326 .3007 .3246 .2993 .280
116.217 7 .2494 .3331 .3022 .2649 .2684 .2958 .3007 .2769 .2818 .273

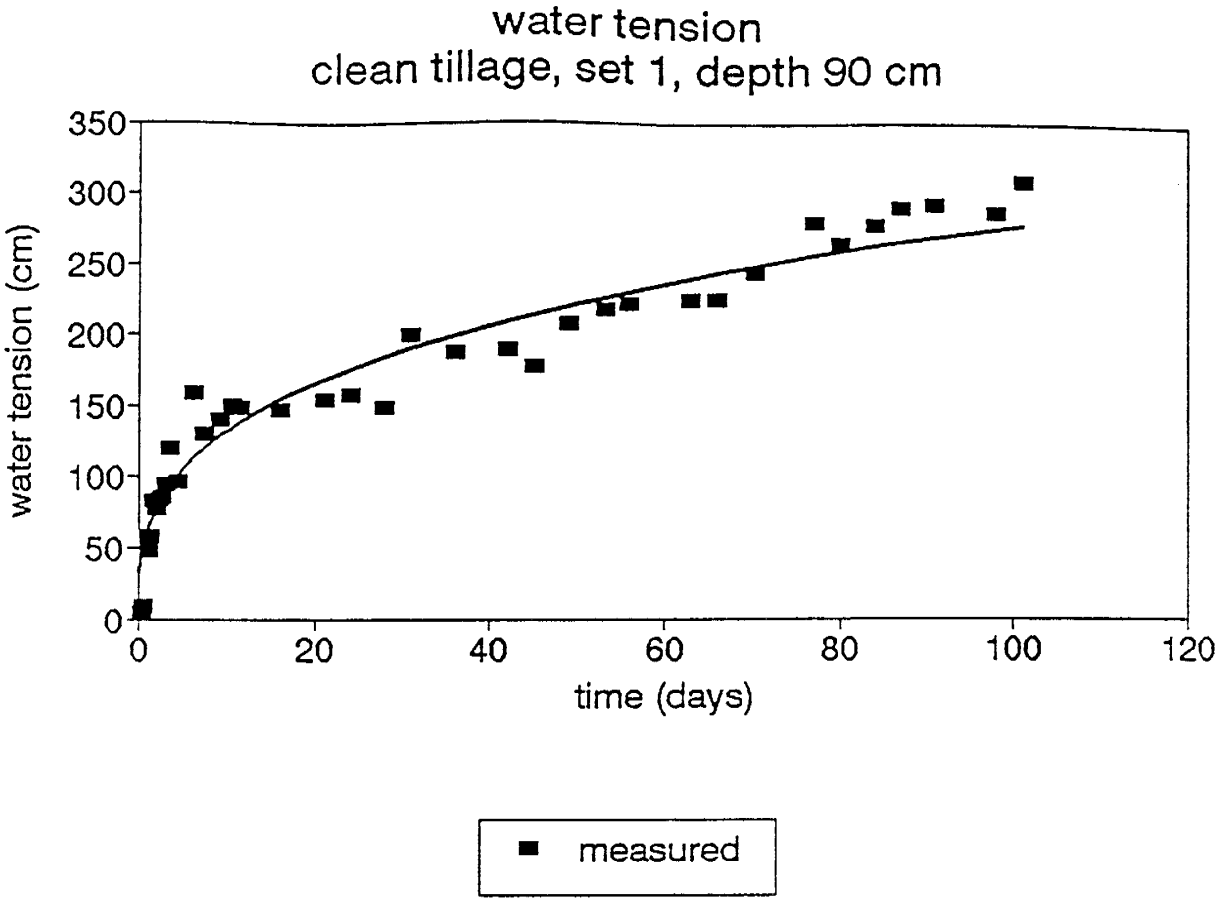
Appendix G: Measured and fitted soil water tension and volumetric water content for all data sets.

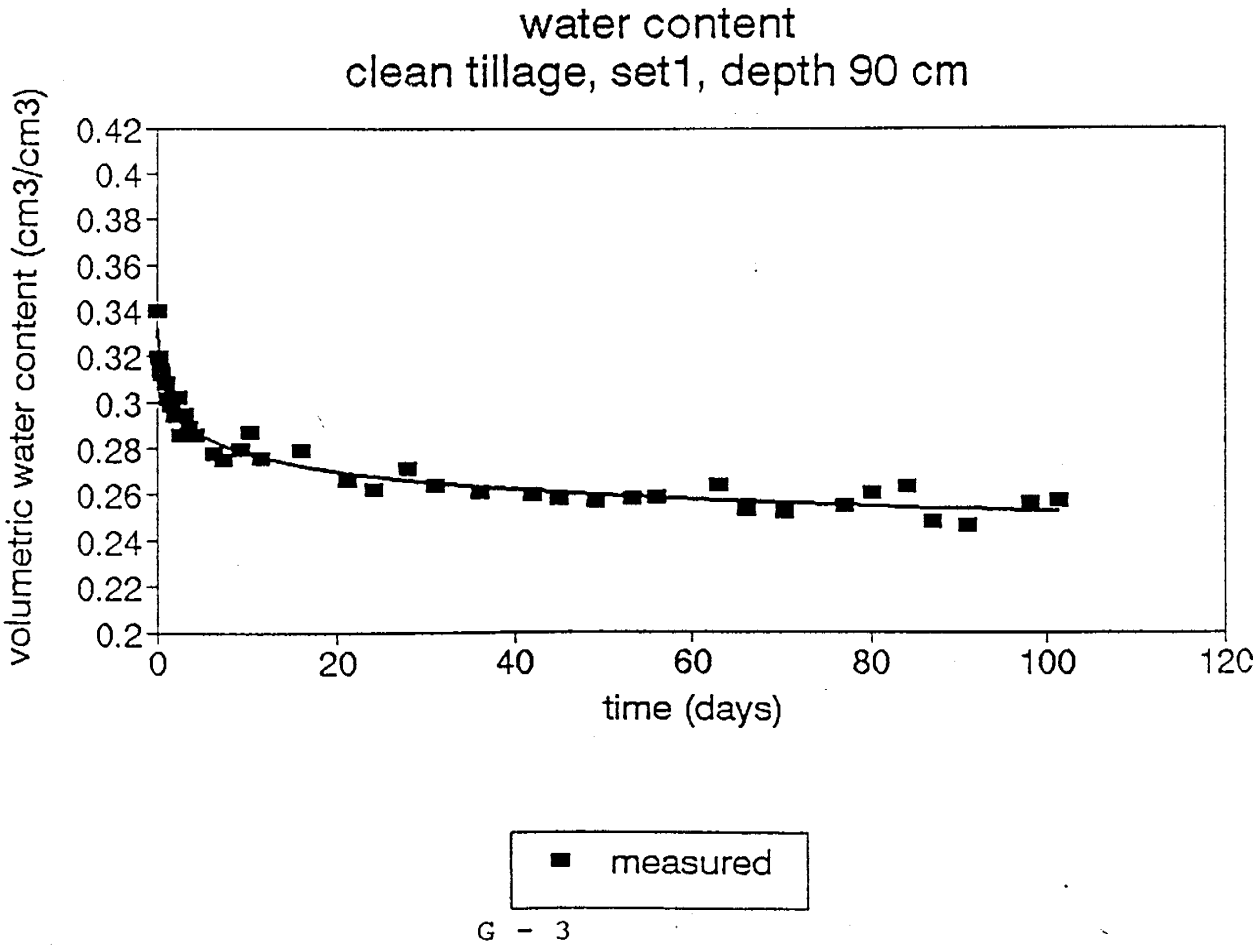


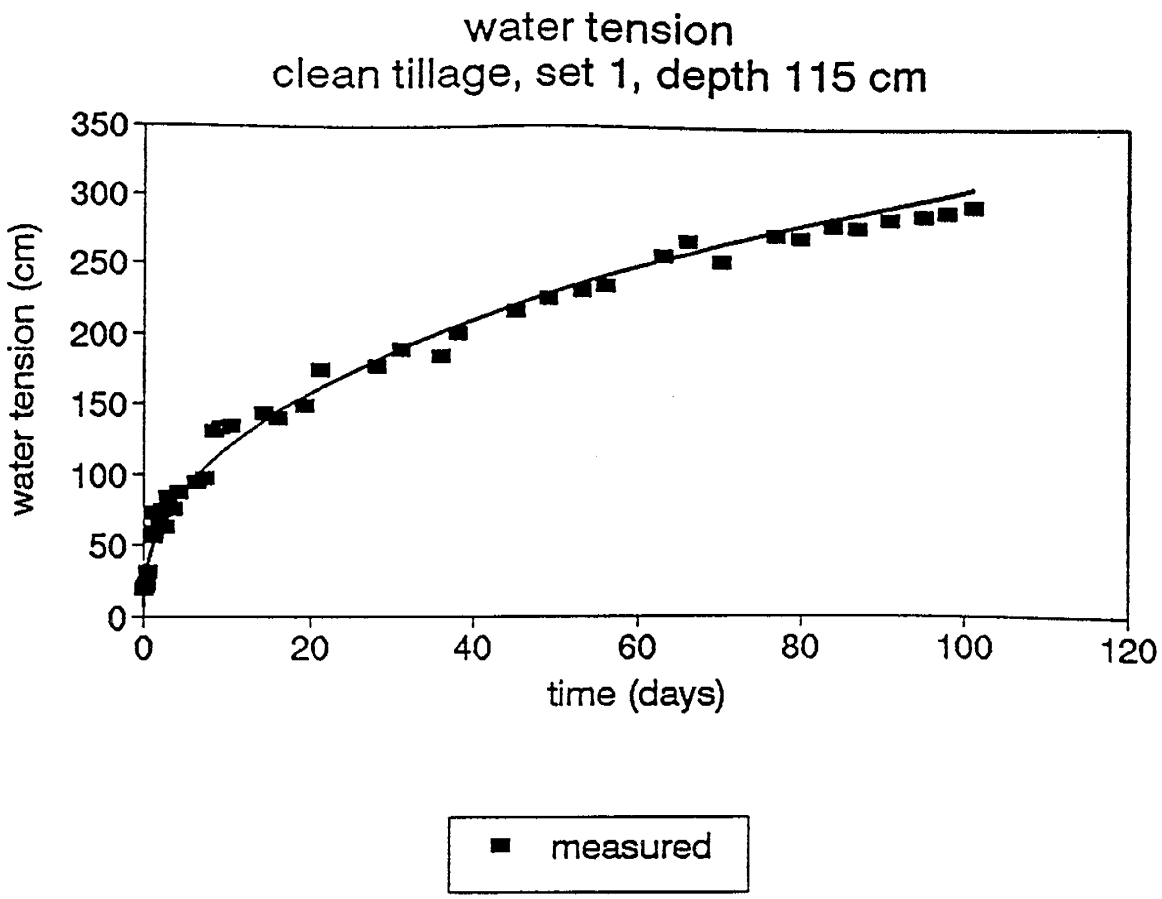


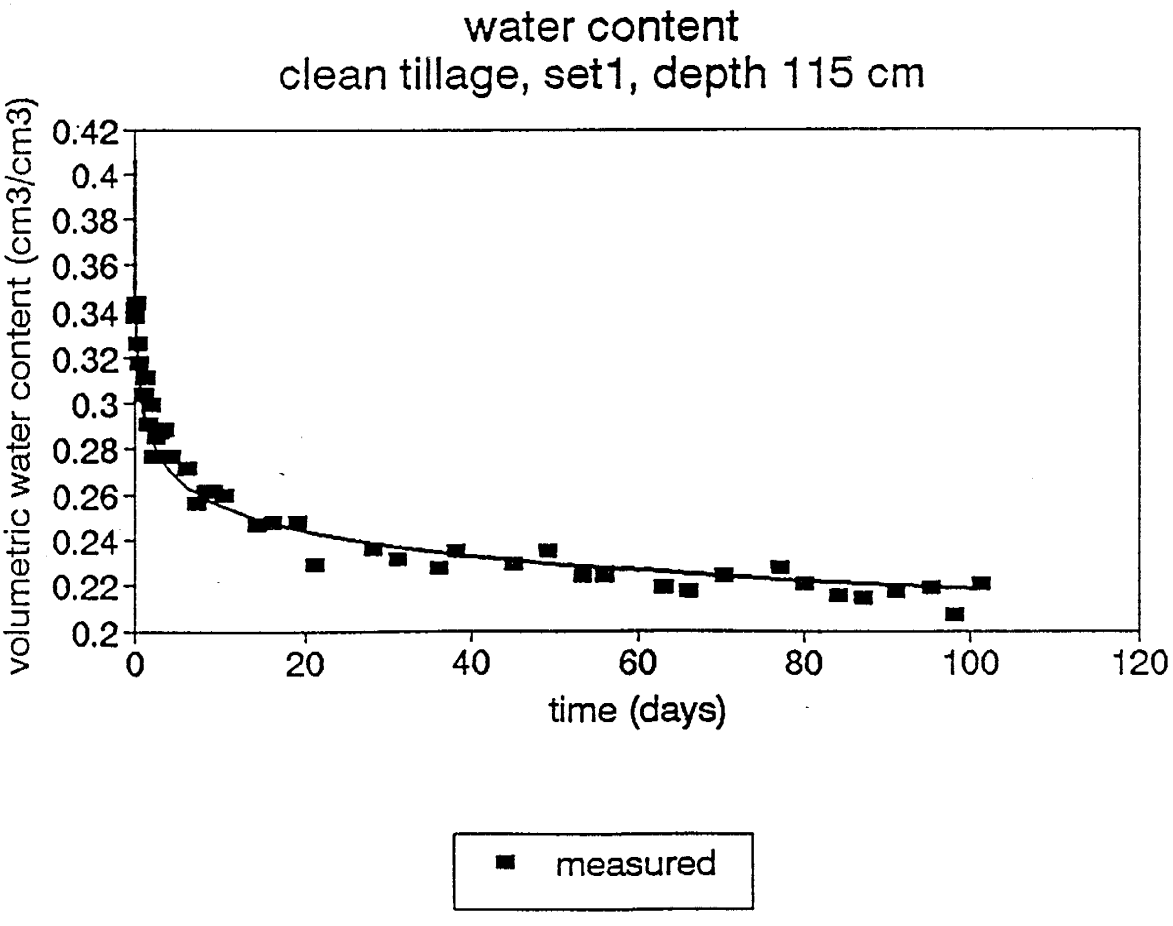

water tension
clean tillage, set 1, depth 65 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

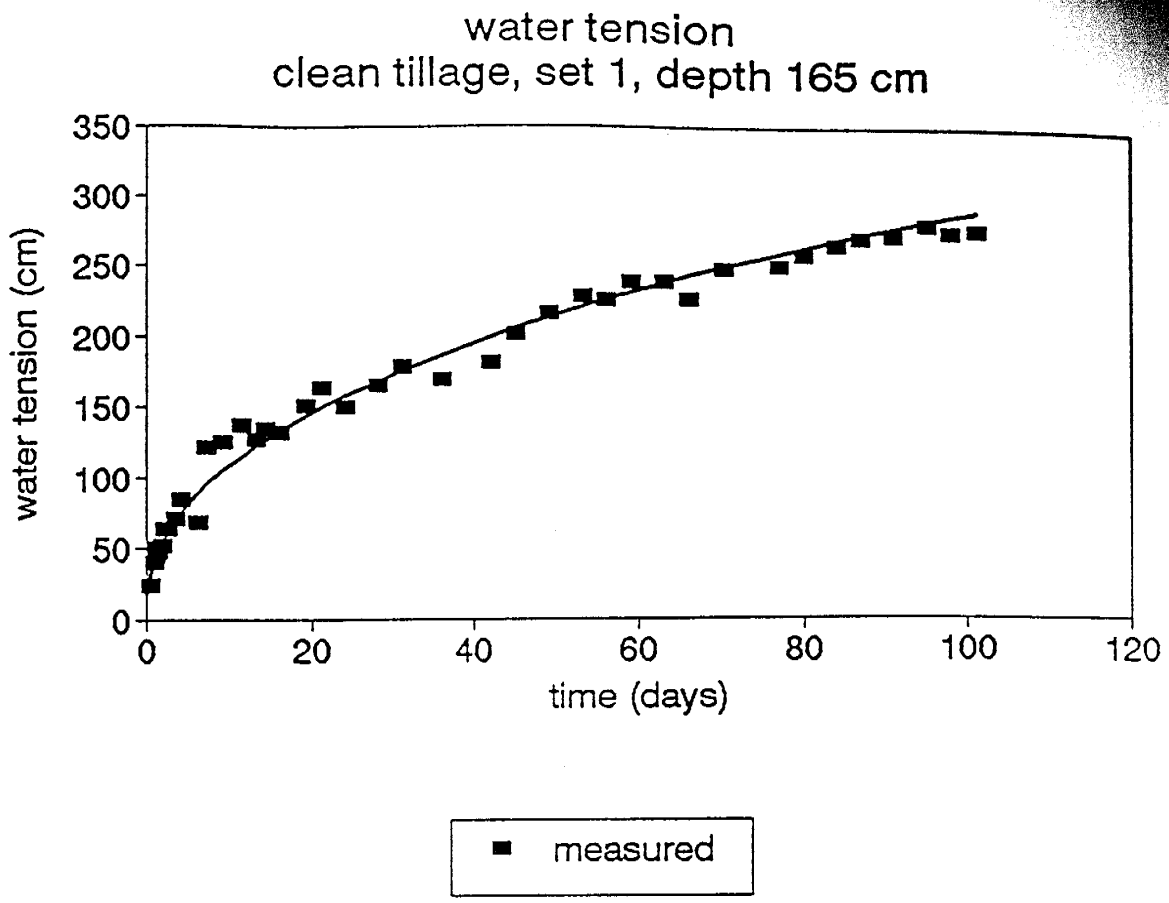

water content
clean tillage, set1, depth 65 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

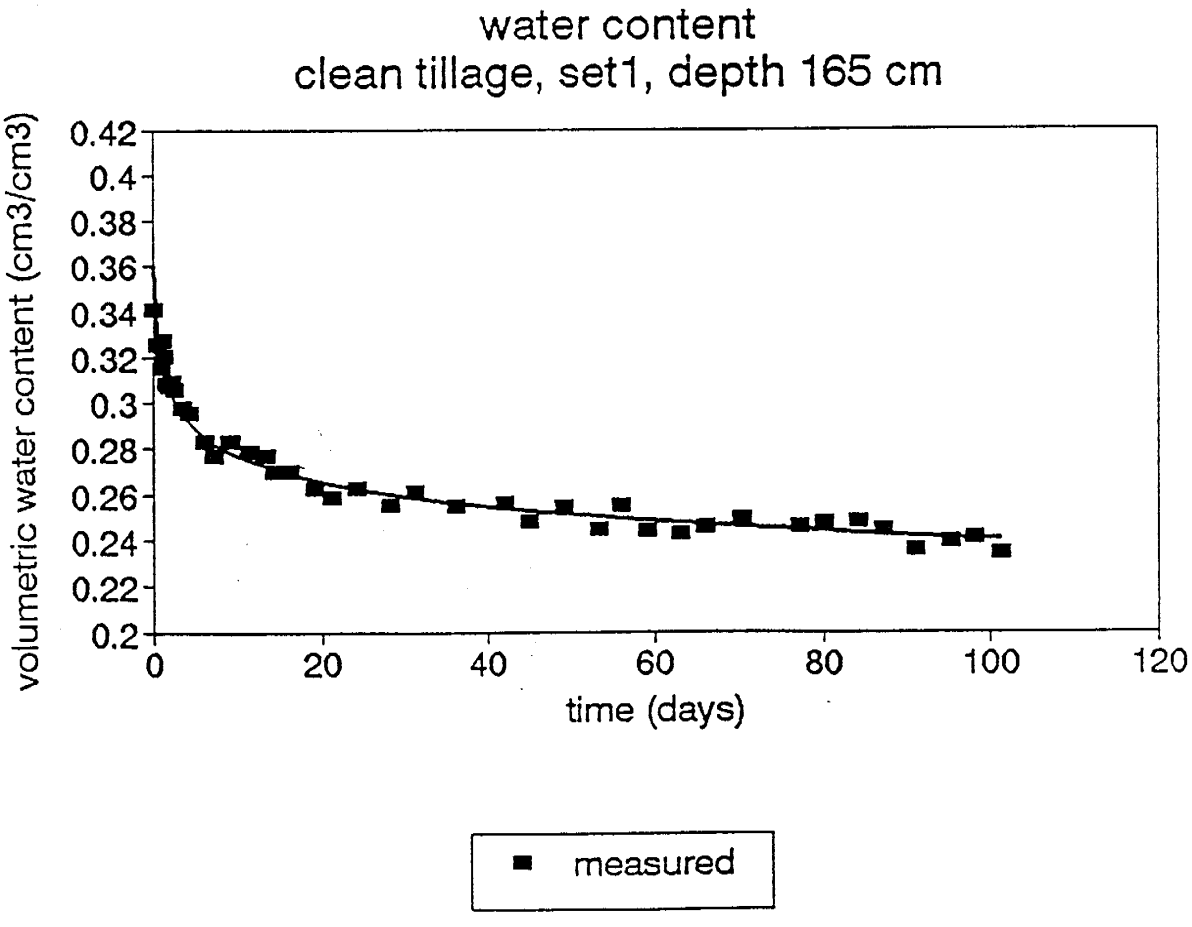

water tension
clean tillage, set 1, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

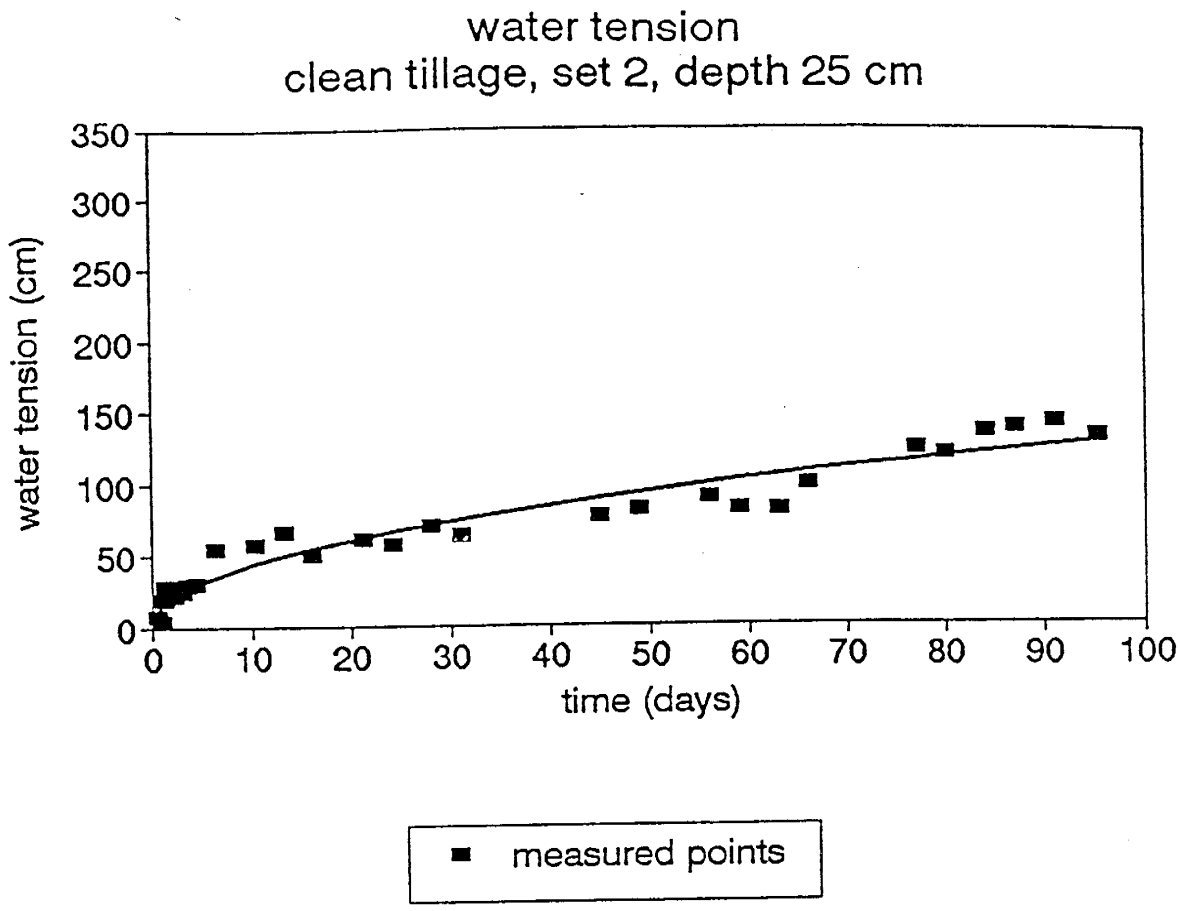

water content
clean tillage, set1, depth 90 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

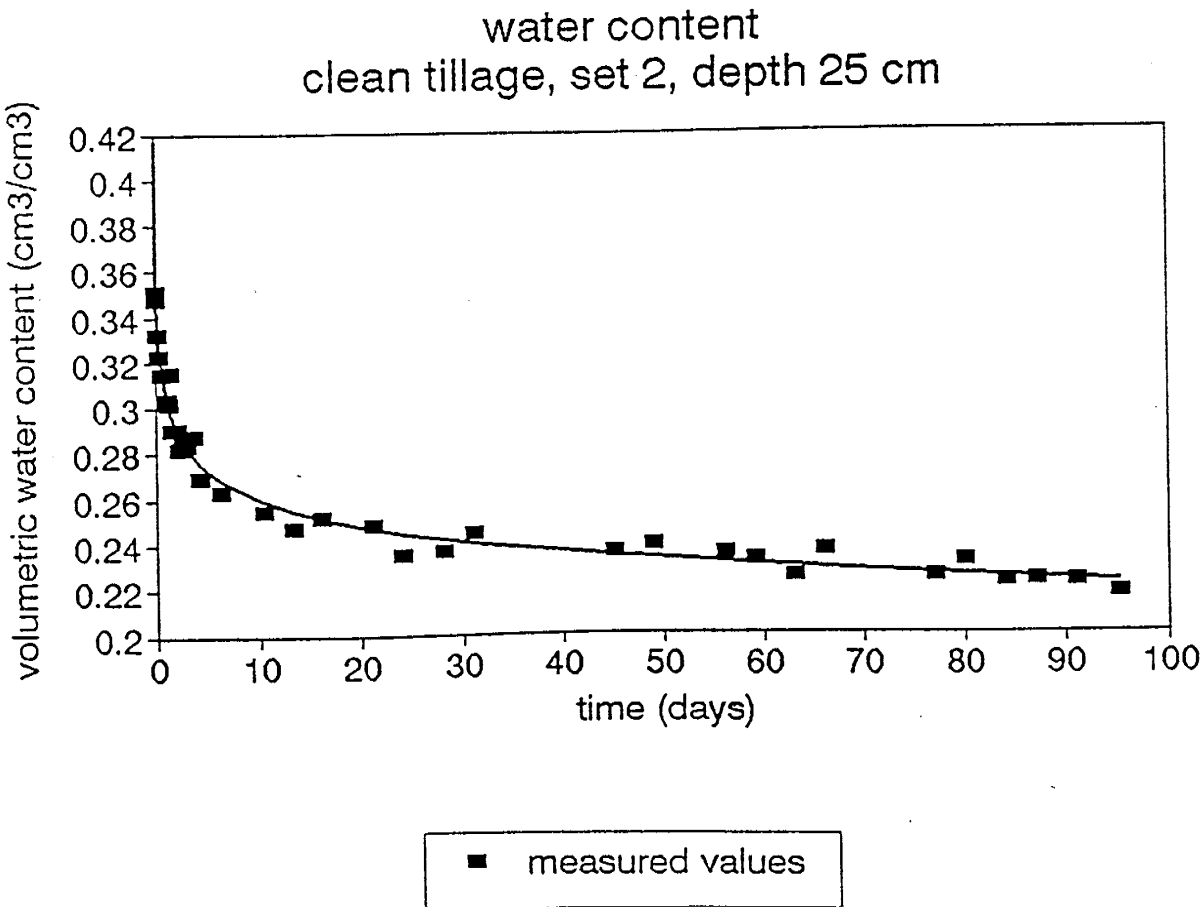

water tension
clean tillage, set 1, depth 115 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

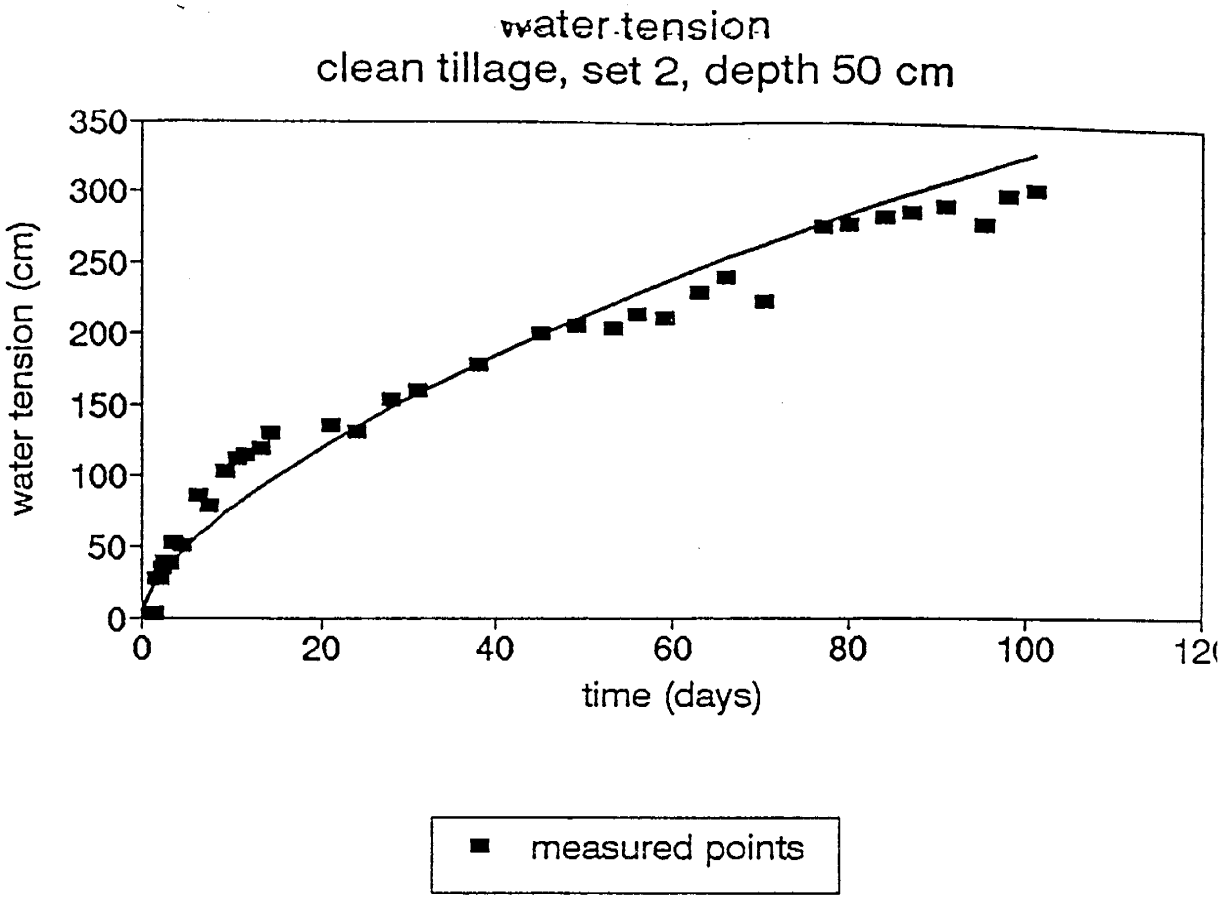

water content
clean tillage, set1, depth 115 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

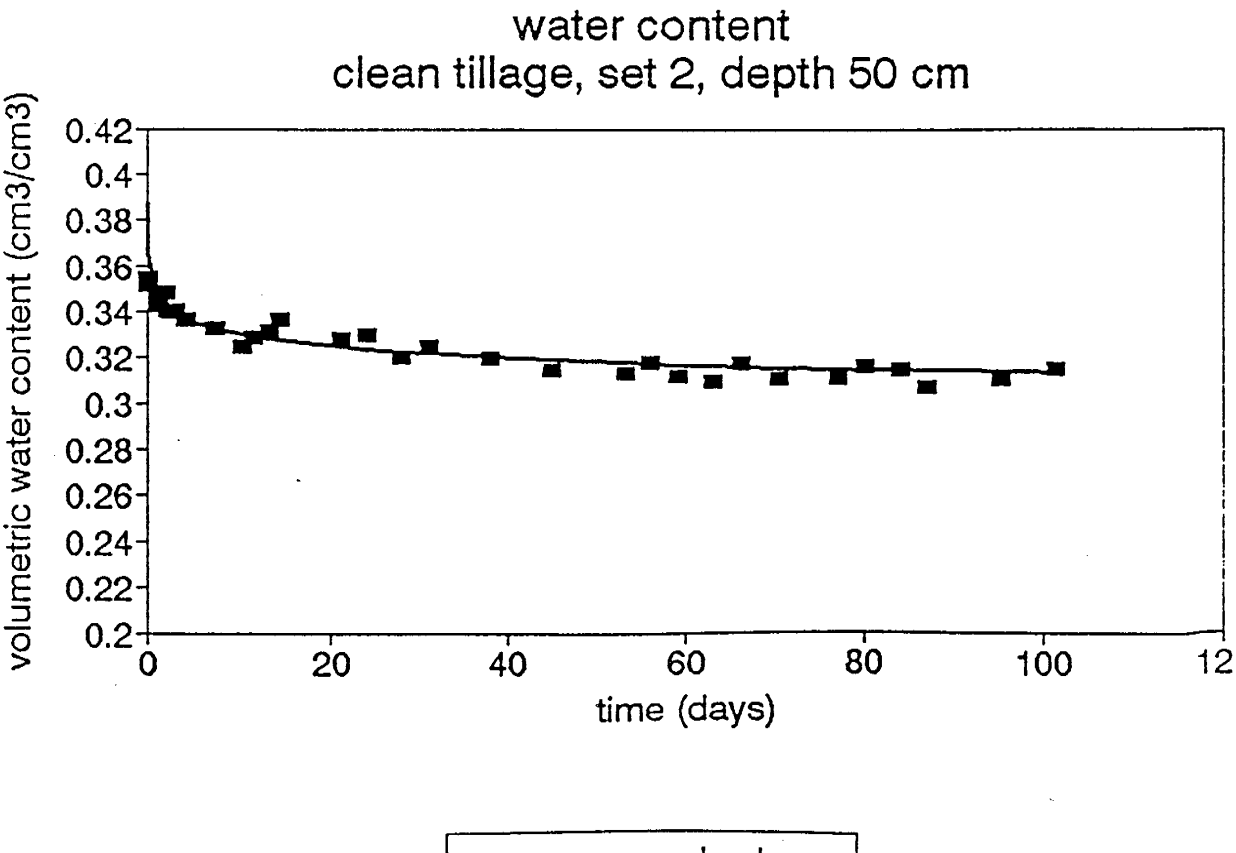

water tension
clean tillage, set 1, depth 165 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

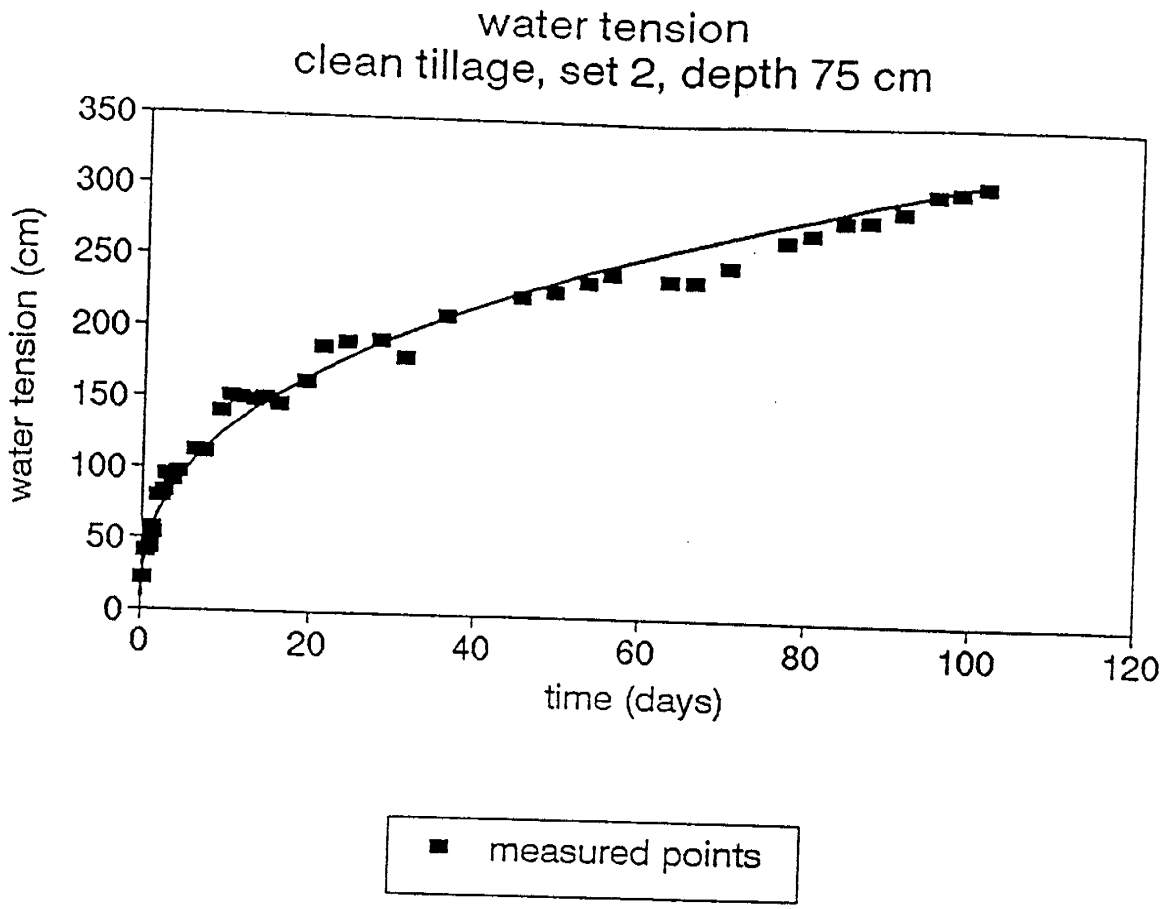

water content
clean tillage, set1, depth 165 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

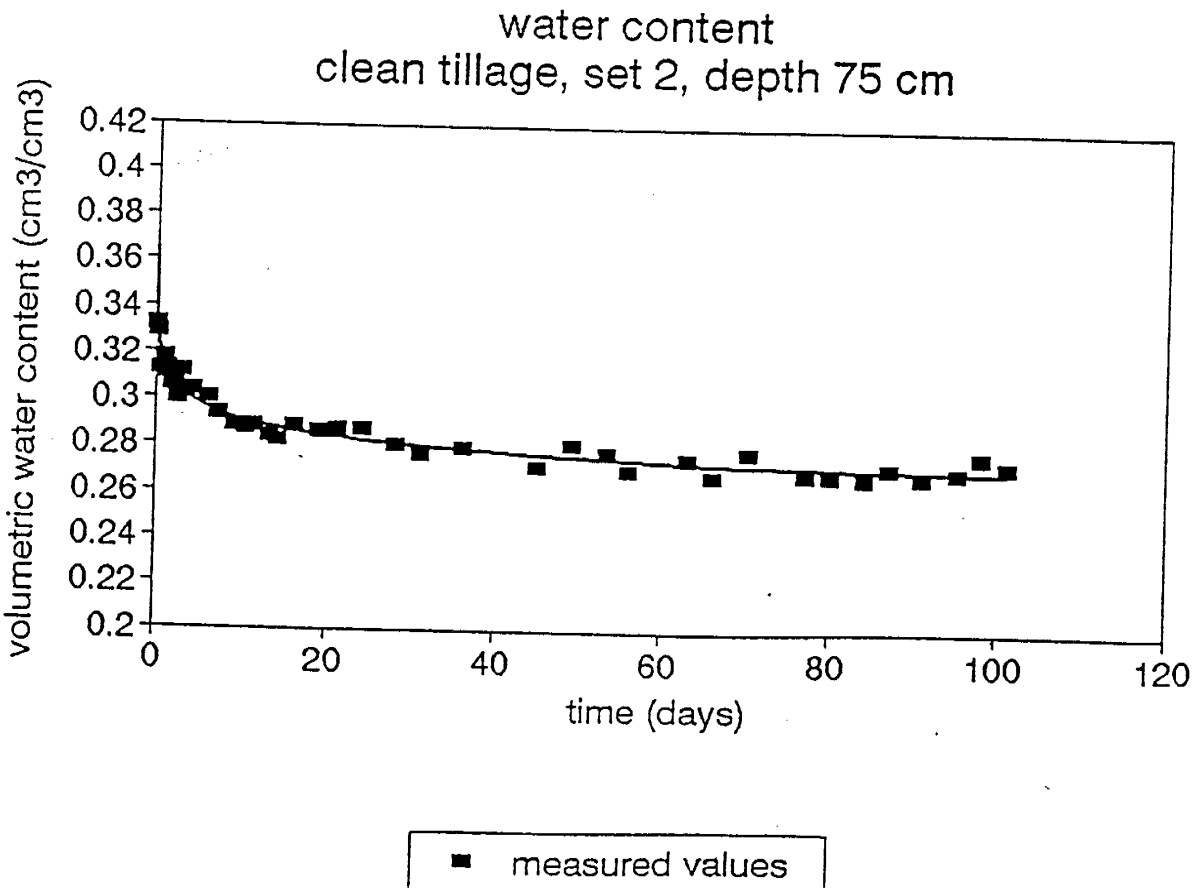

water tension
clean tillage, set 2, depth 25 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured points

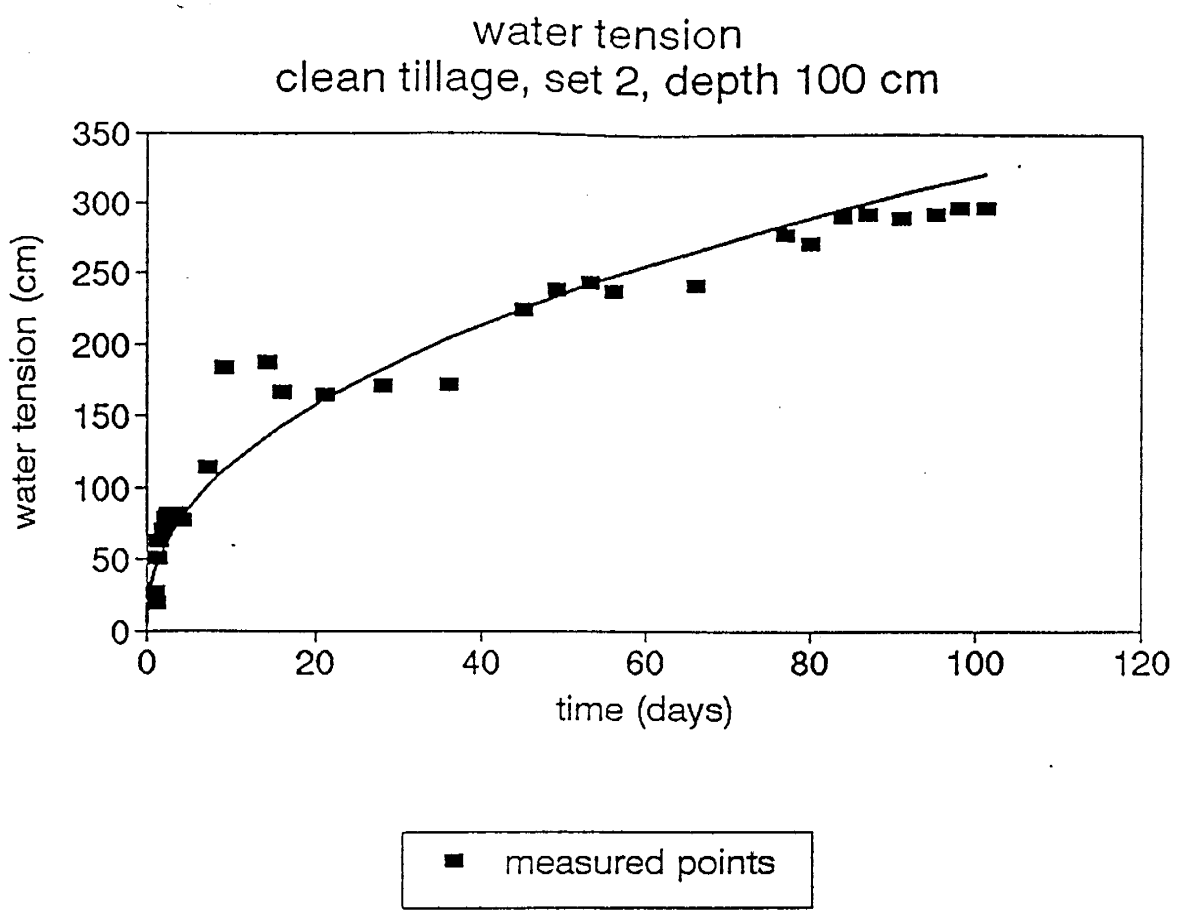

water content
clean tillage, set 2, depth 25 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured values

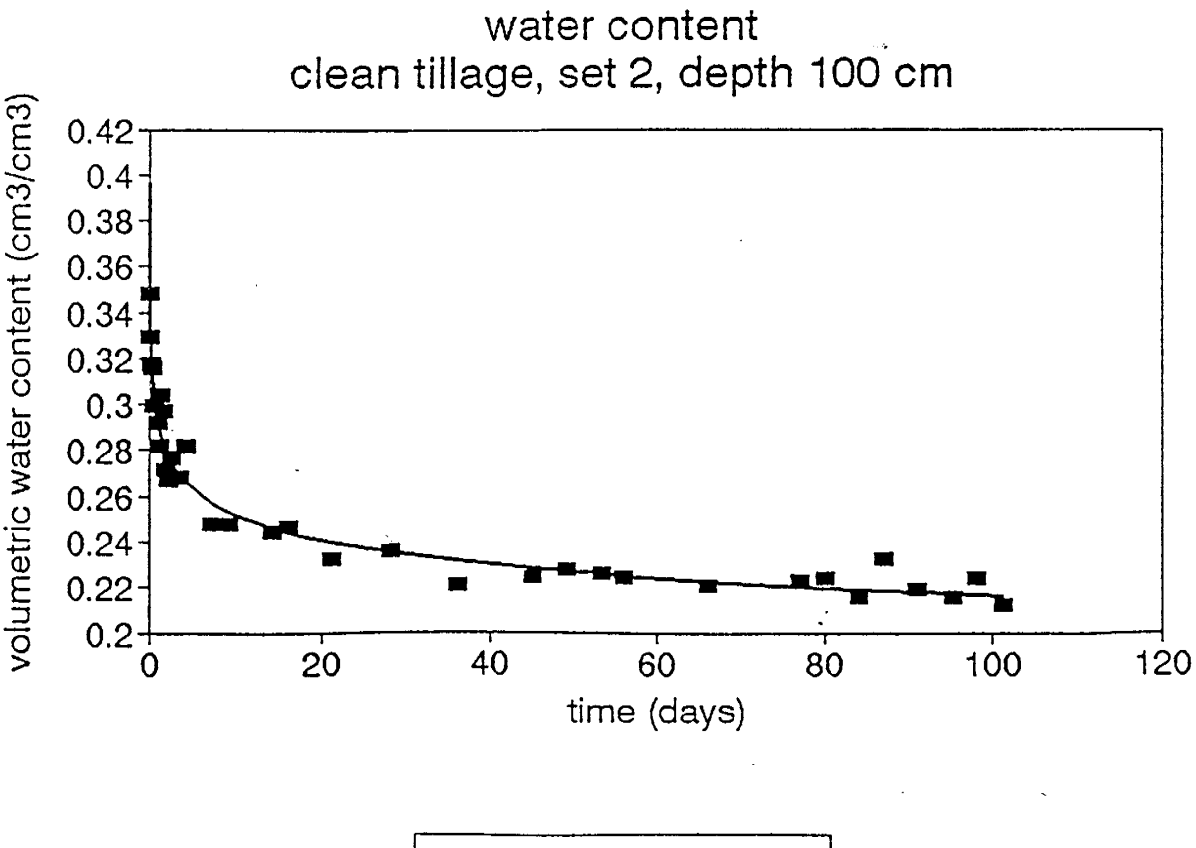

water tension
clean tillage, set 2, depth 50 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
time (days)
measured points

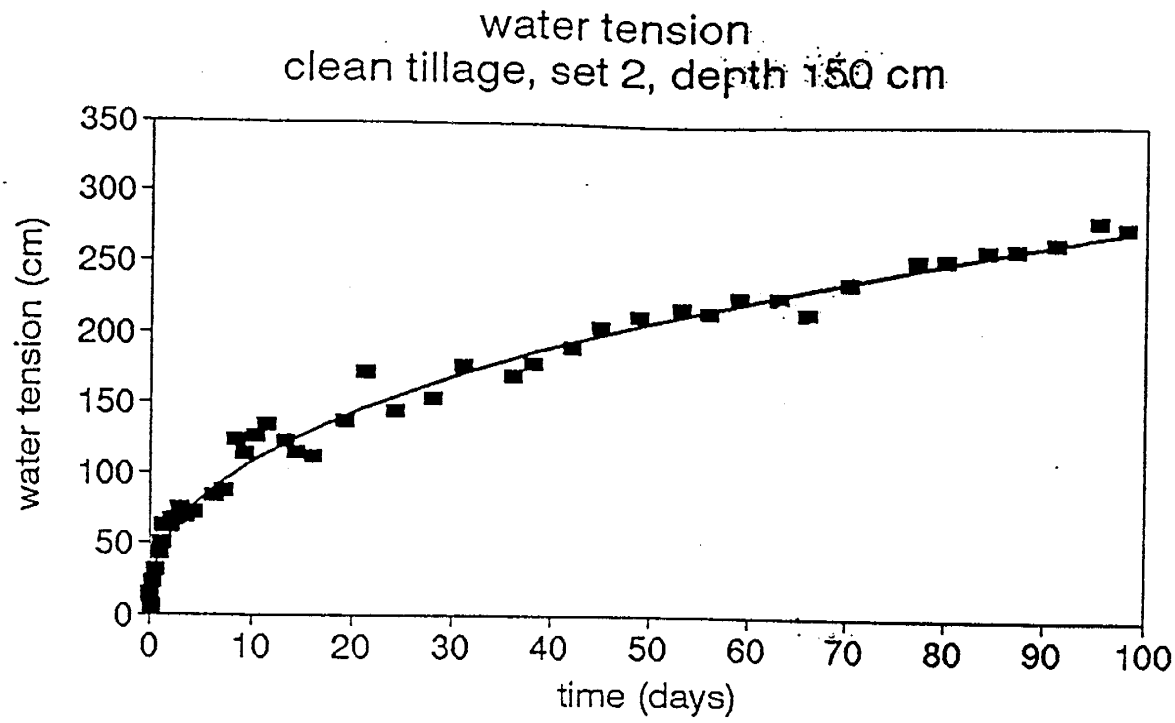

water content
clean tillage, set 2, depth 50 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
time (days)
measured values

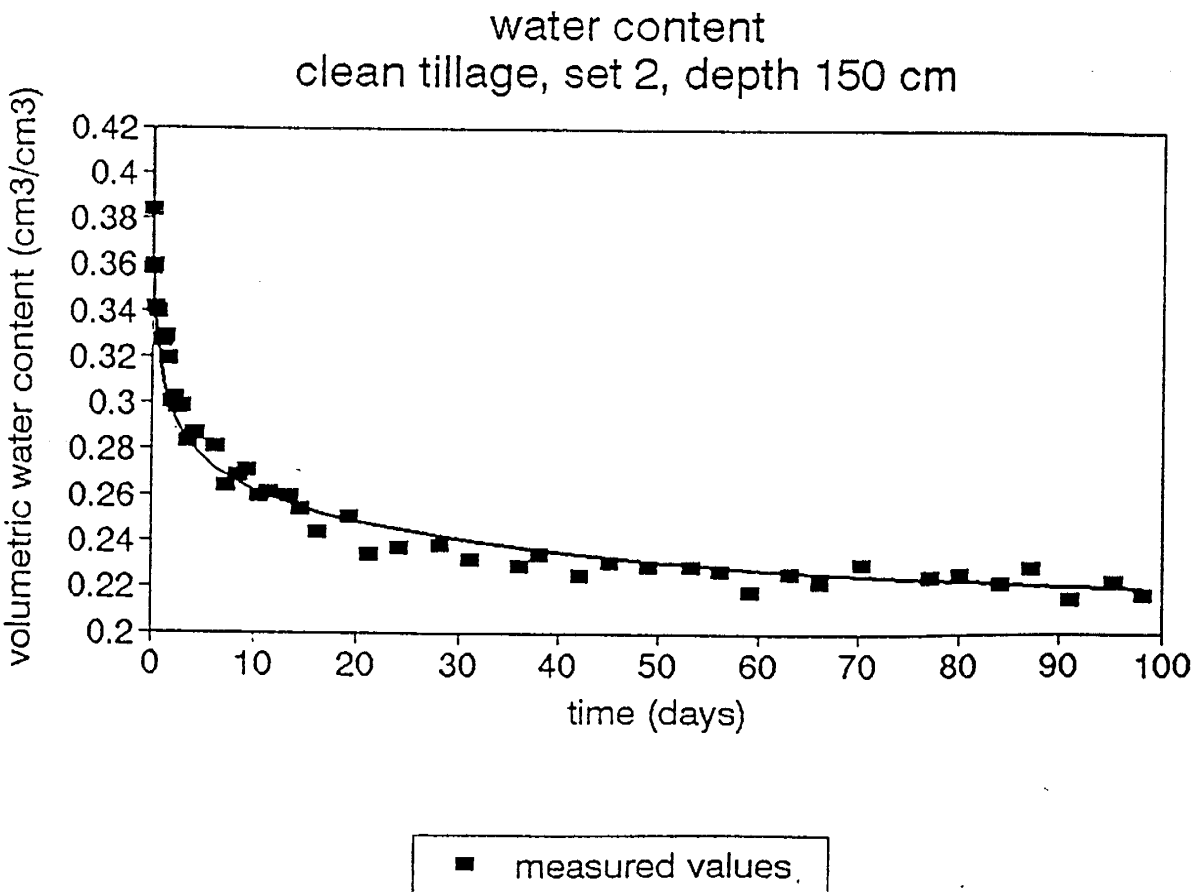

water tension
clean tillage, set 2, depth 75 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured points

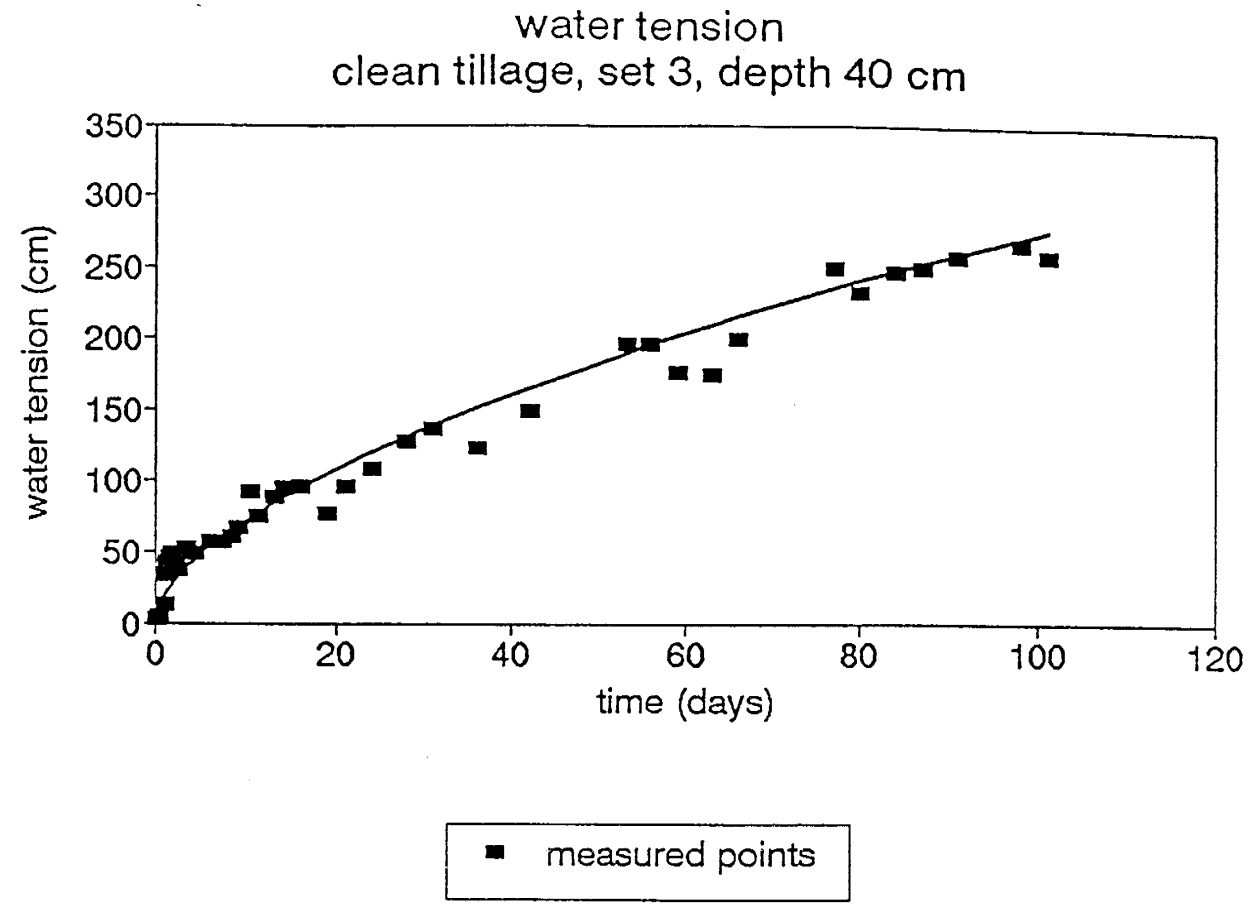

water content
clean tillage, set 2, depth 75 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured values

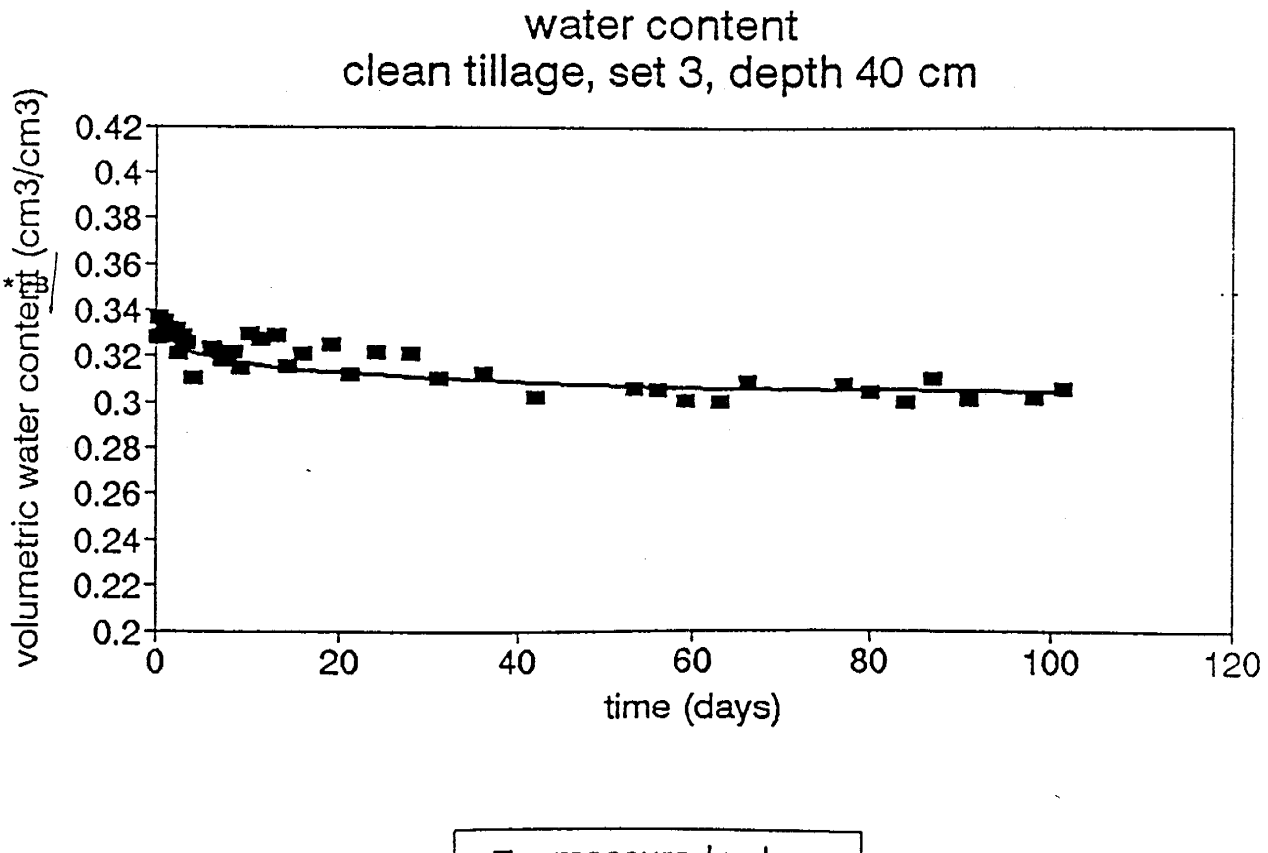

water tension
clean tillage, set 2, depth 100 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured points

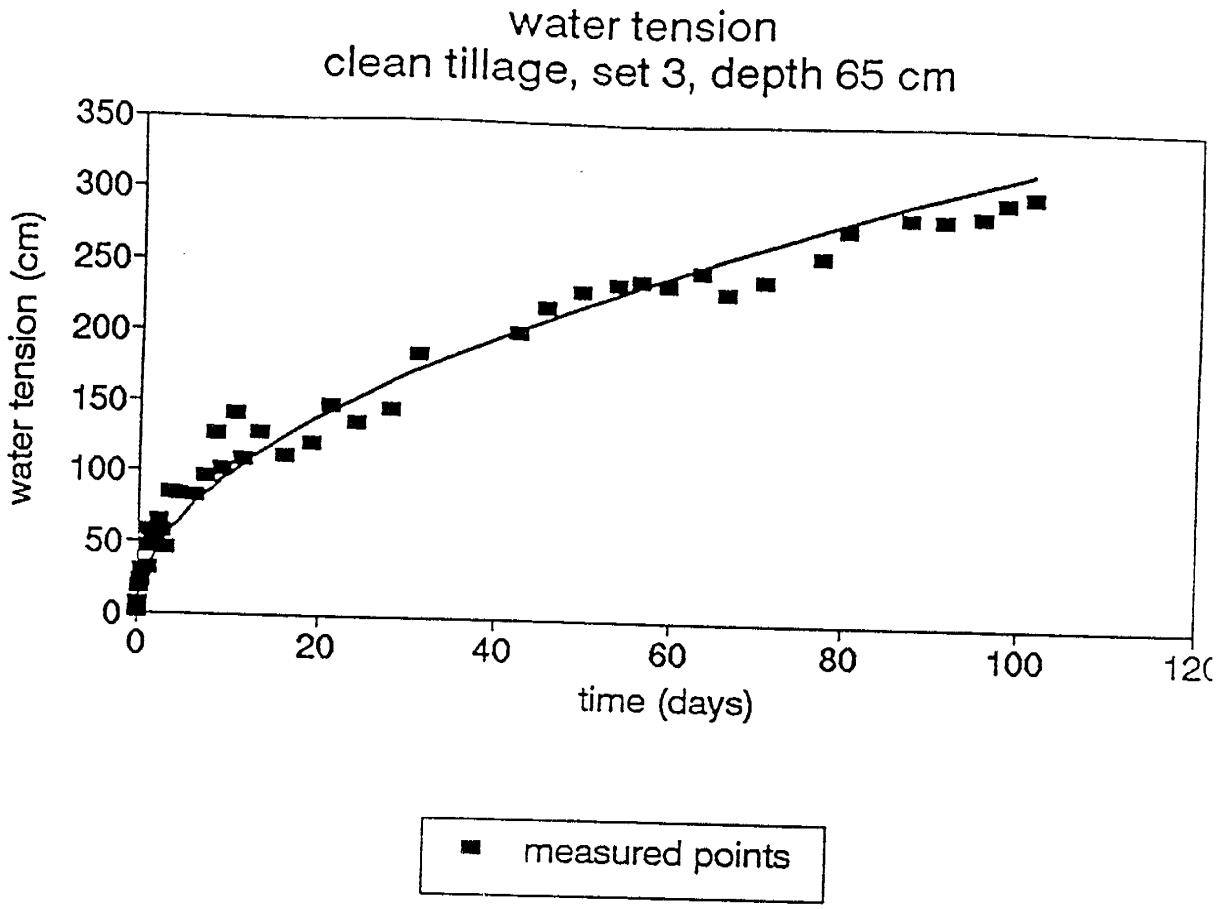

water content
clean tillage, set 2, depth 100 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured values

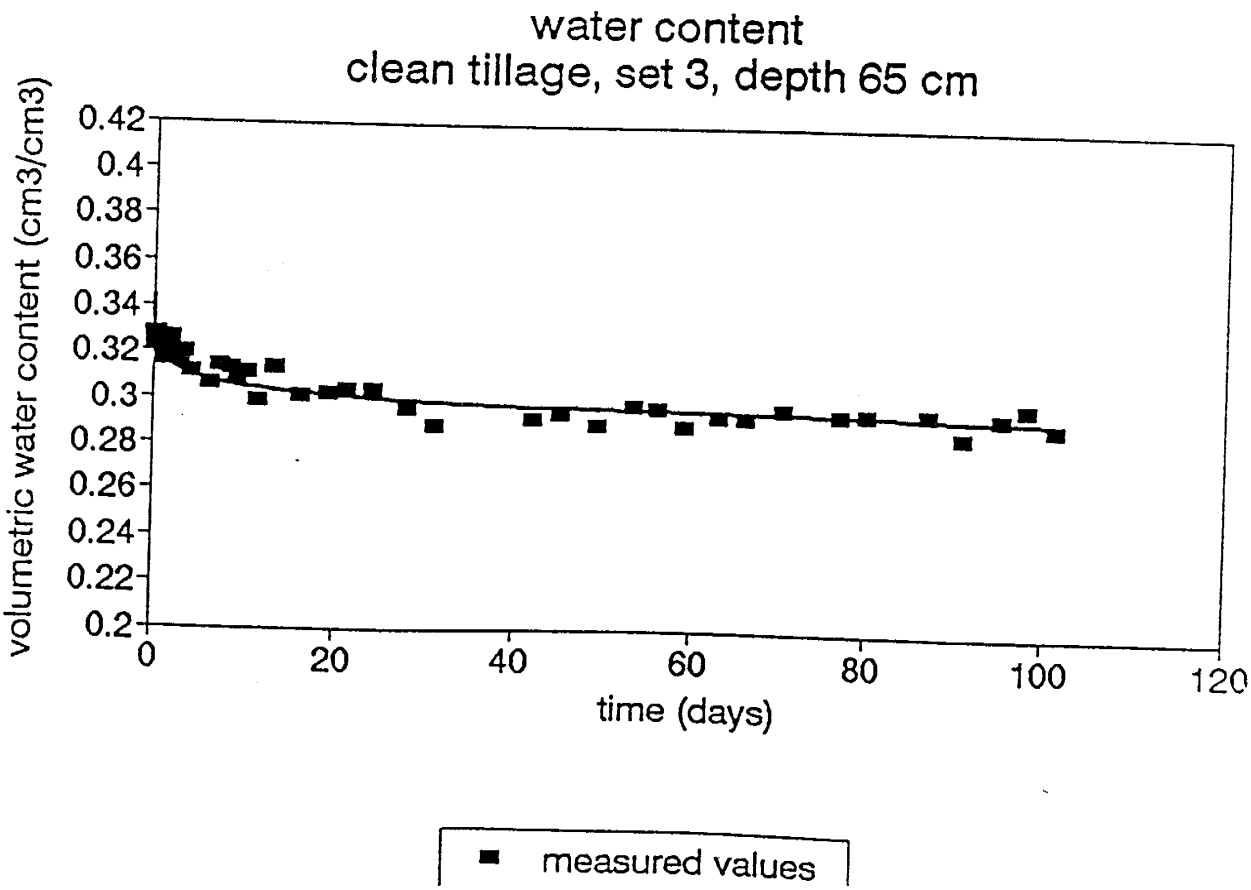

water tension
clean tillage, set 2, depth 150 cm
water tension (cm)
time (days)
0
50
100
150
200
250
300
350
0
10
20
30
40
50
60
70
80
90
100
measured points

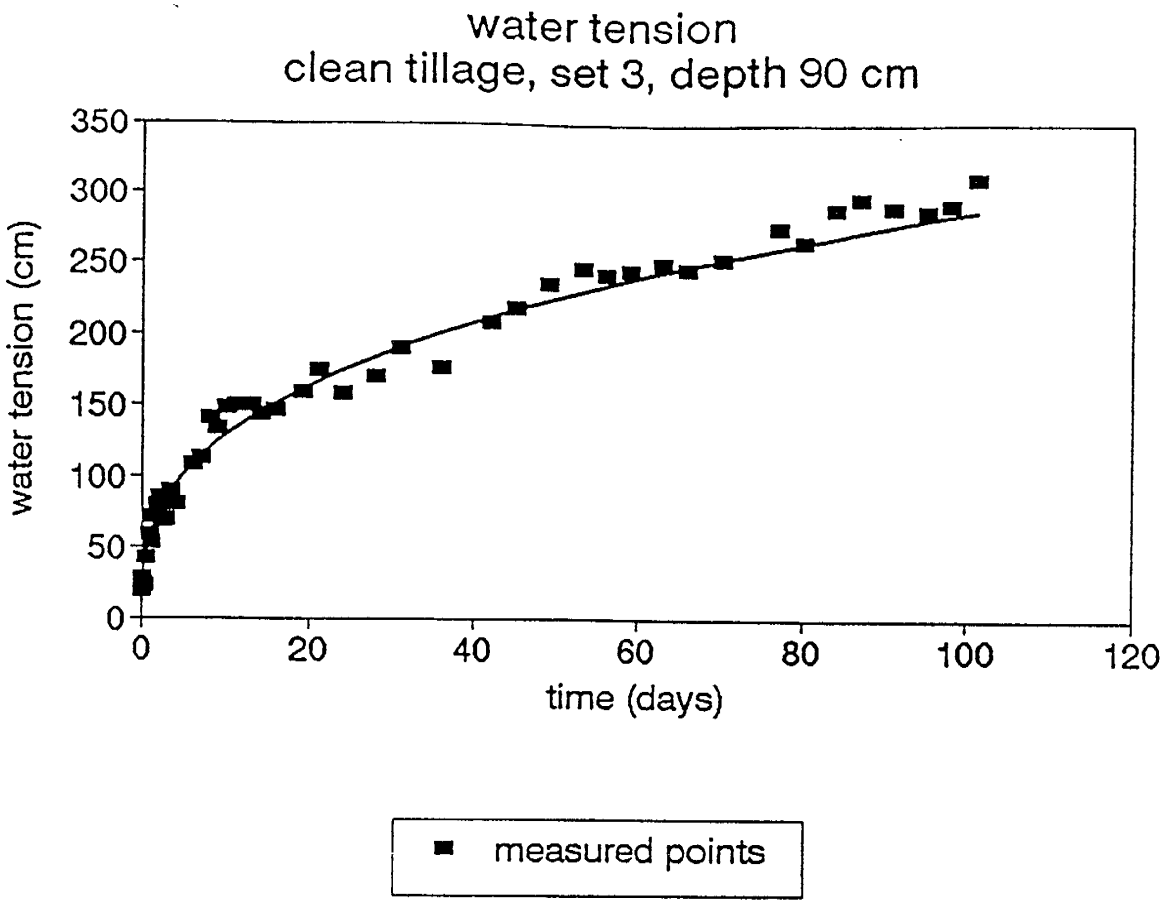

water content
clean tillage, set 2, depth 150 cm
volumetric water content (cm3/cm3)
time (days)
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
0.42
0
10
20
30
40
50
60
70
80
90
100
measured values

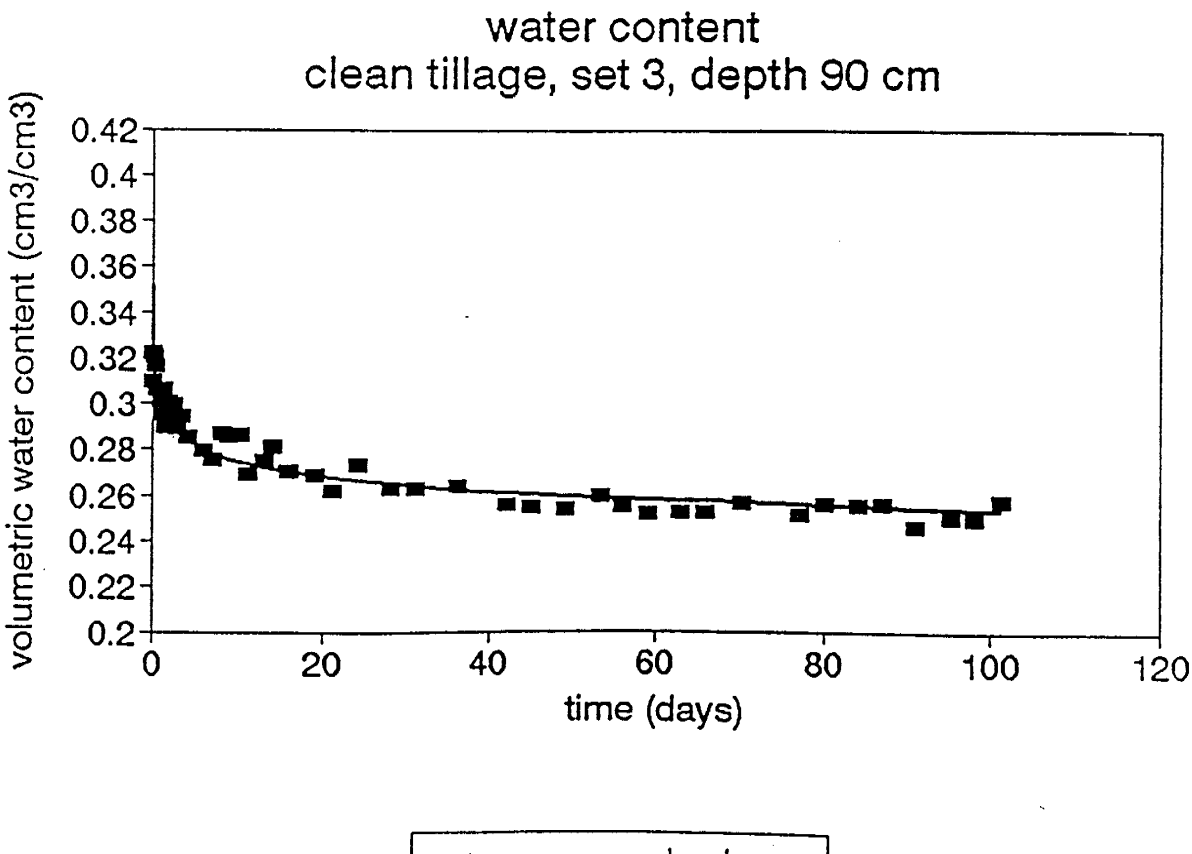

water tension
clean tillage, set 3, depth 40 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured points

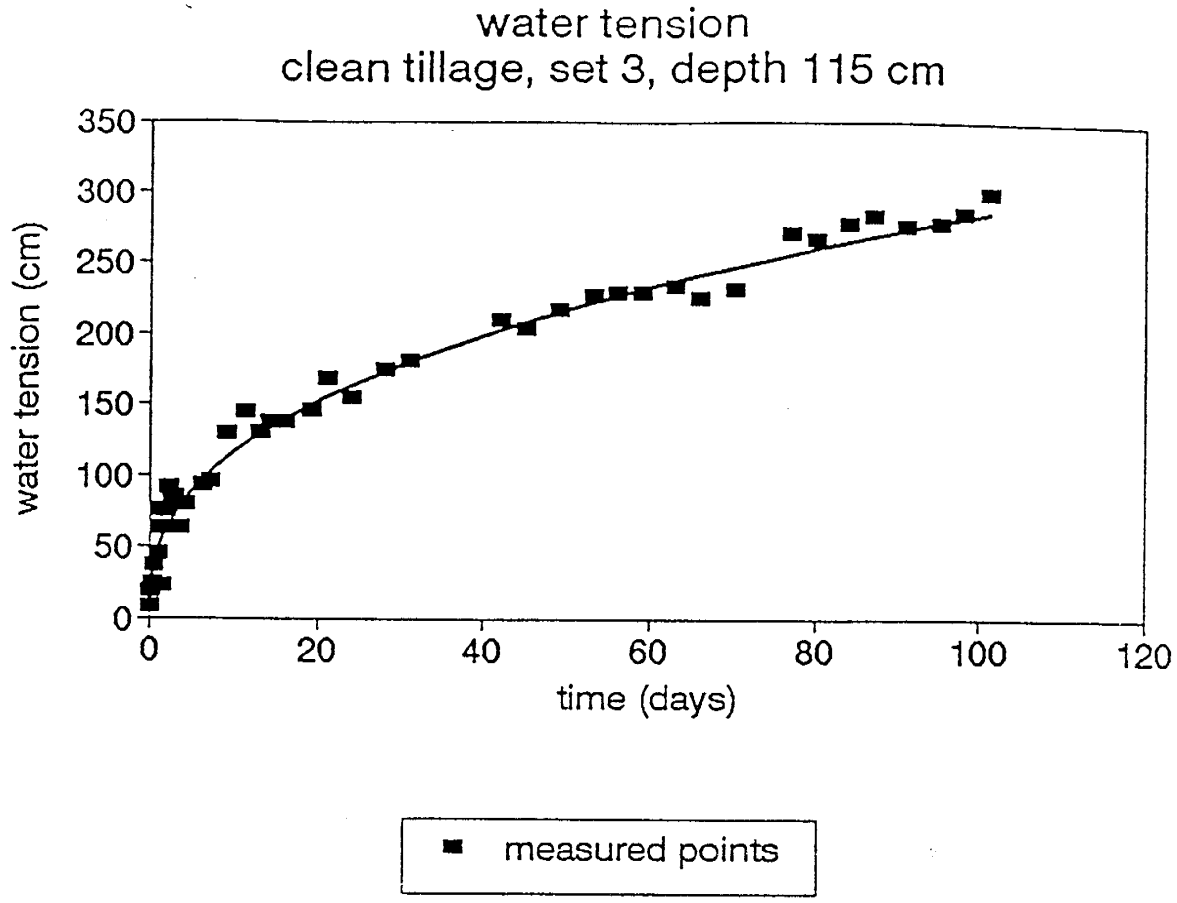

water content
clean tillage, set 3, depth 40 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured values

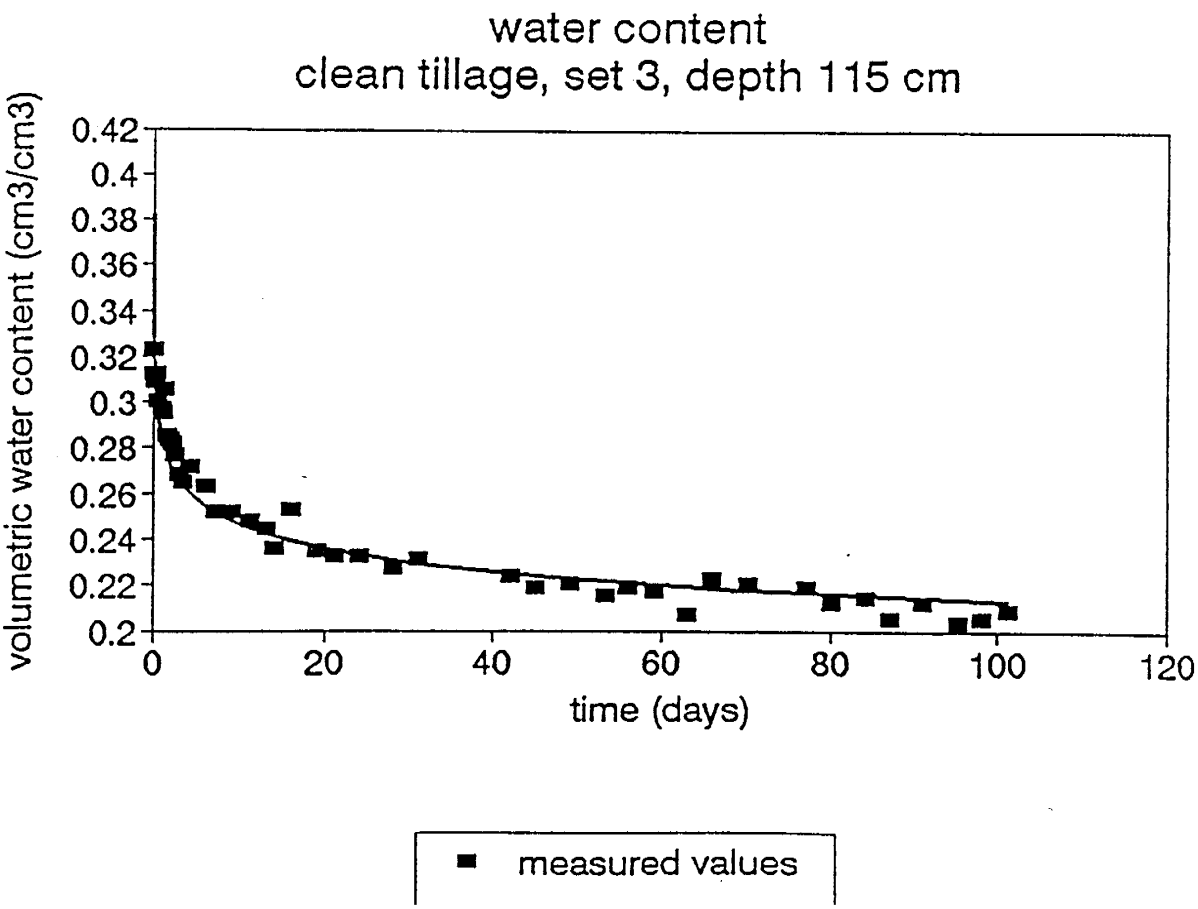

water tension
clean tillage, set 3, depth 65 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured points

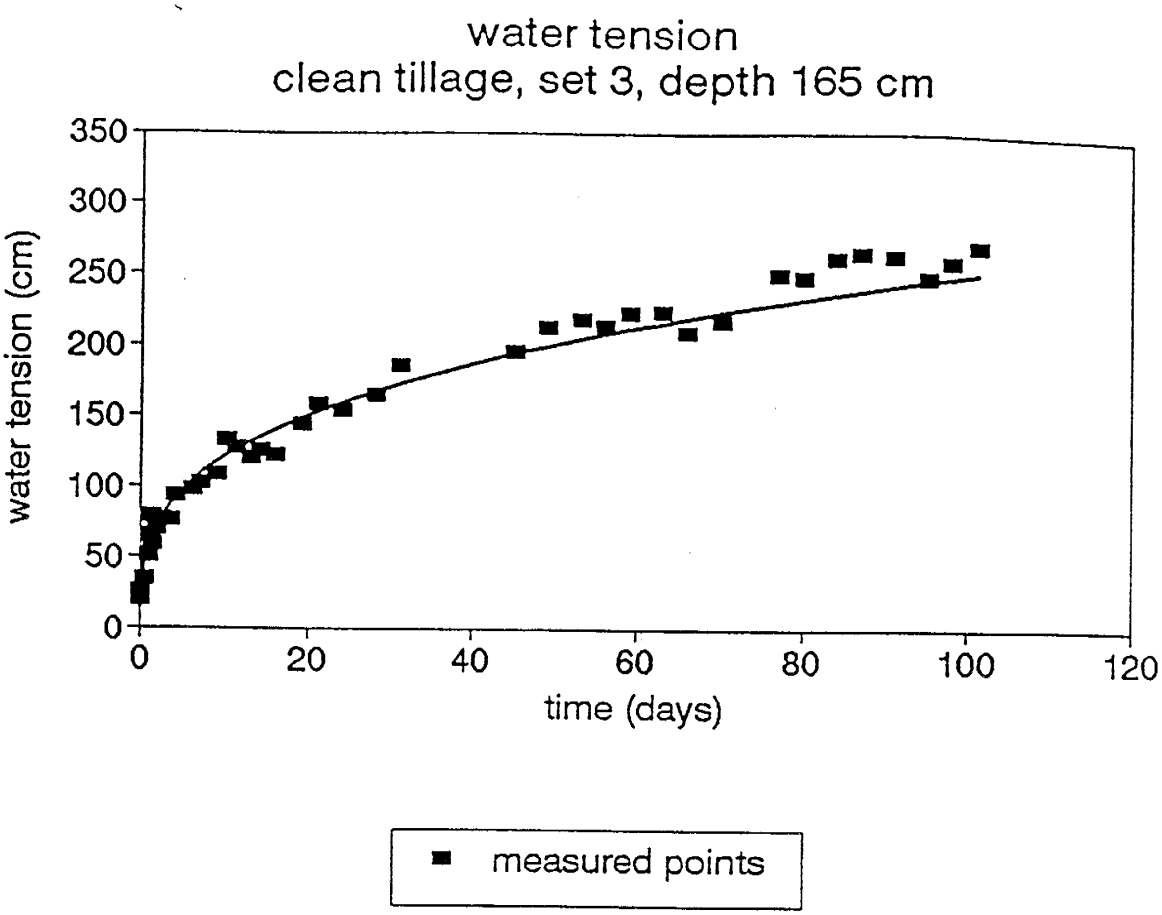

water content
clean tillage, set 3, depth 65 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured values

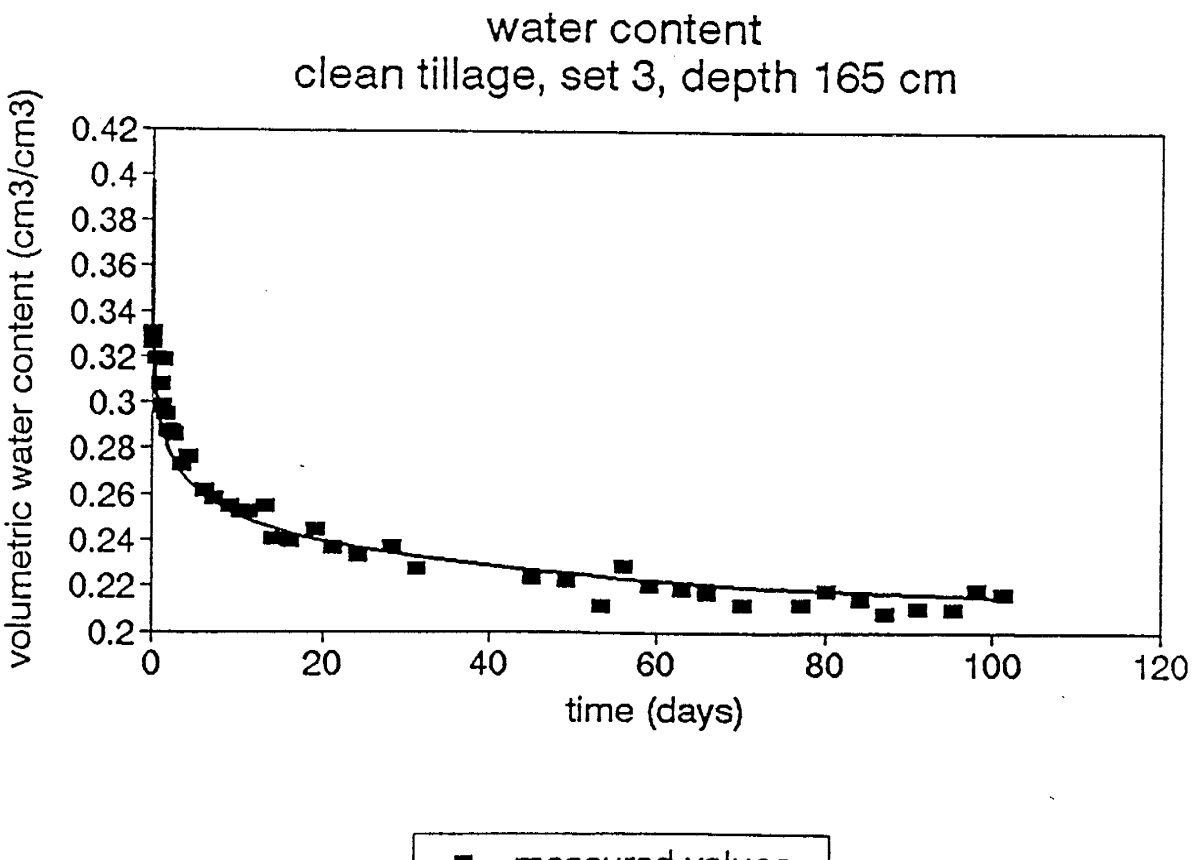

water tension
clean tillage, set 3, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured points

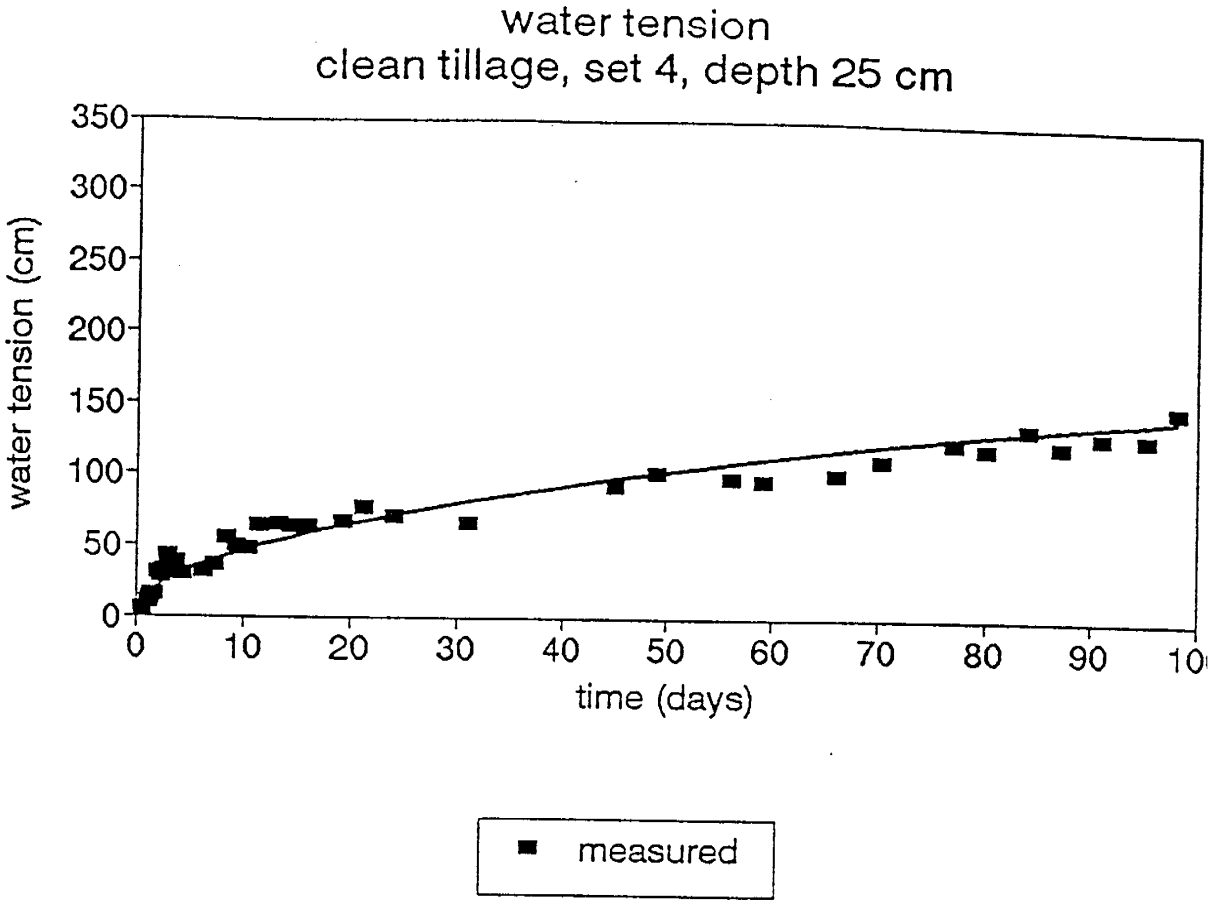

water content
clean tillage, set 3, depth 90 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured values

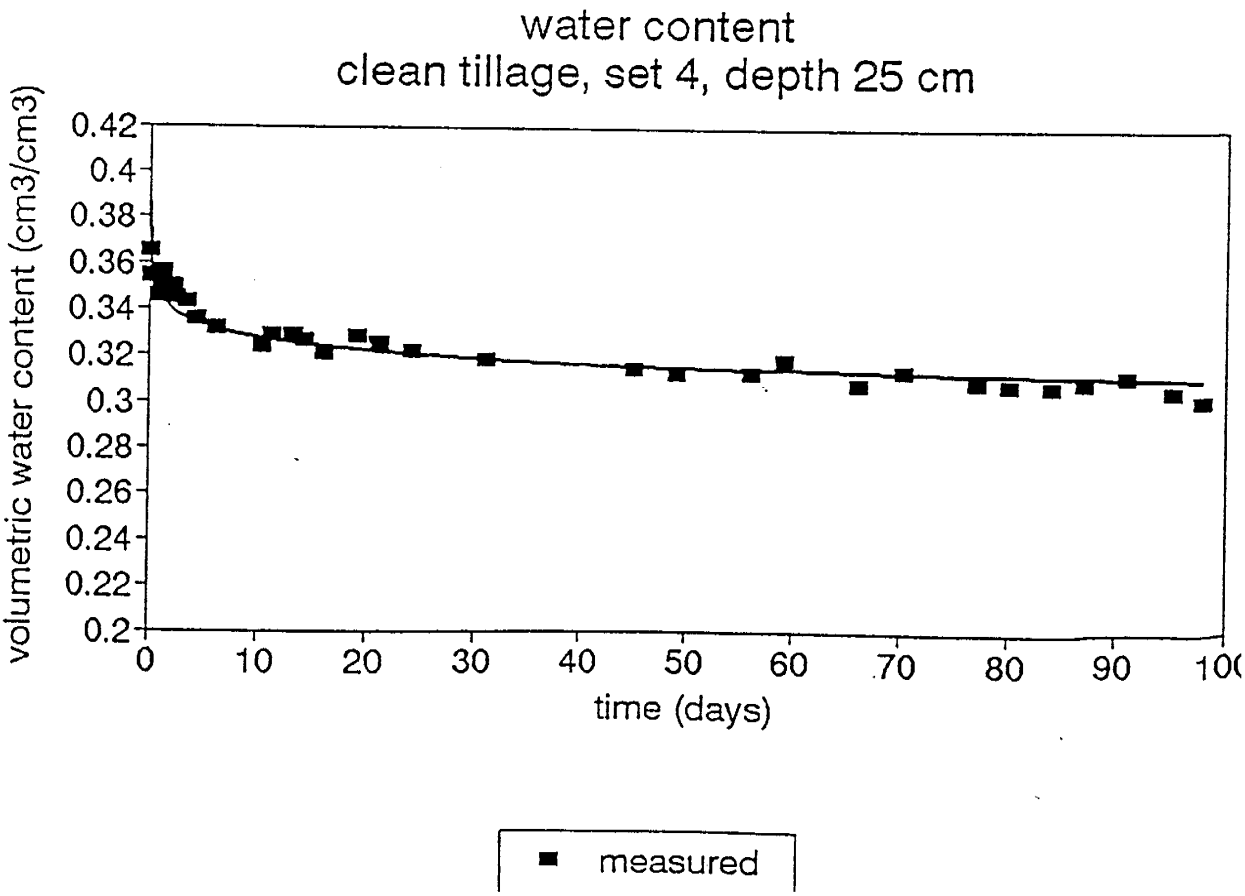

water tension
clean tillage, set 3, depth 115 cm
water tension (cm)
time (days)
0
50
100
150
200
250
300
350
0
20
40
60
80
100
120
measured points

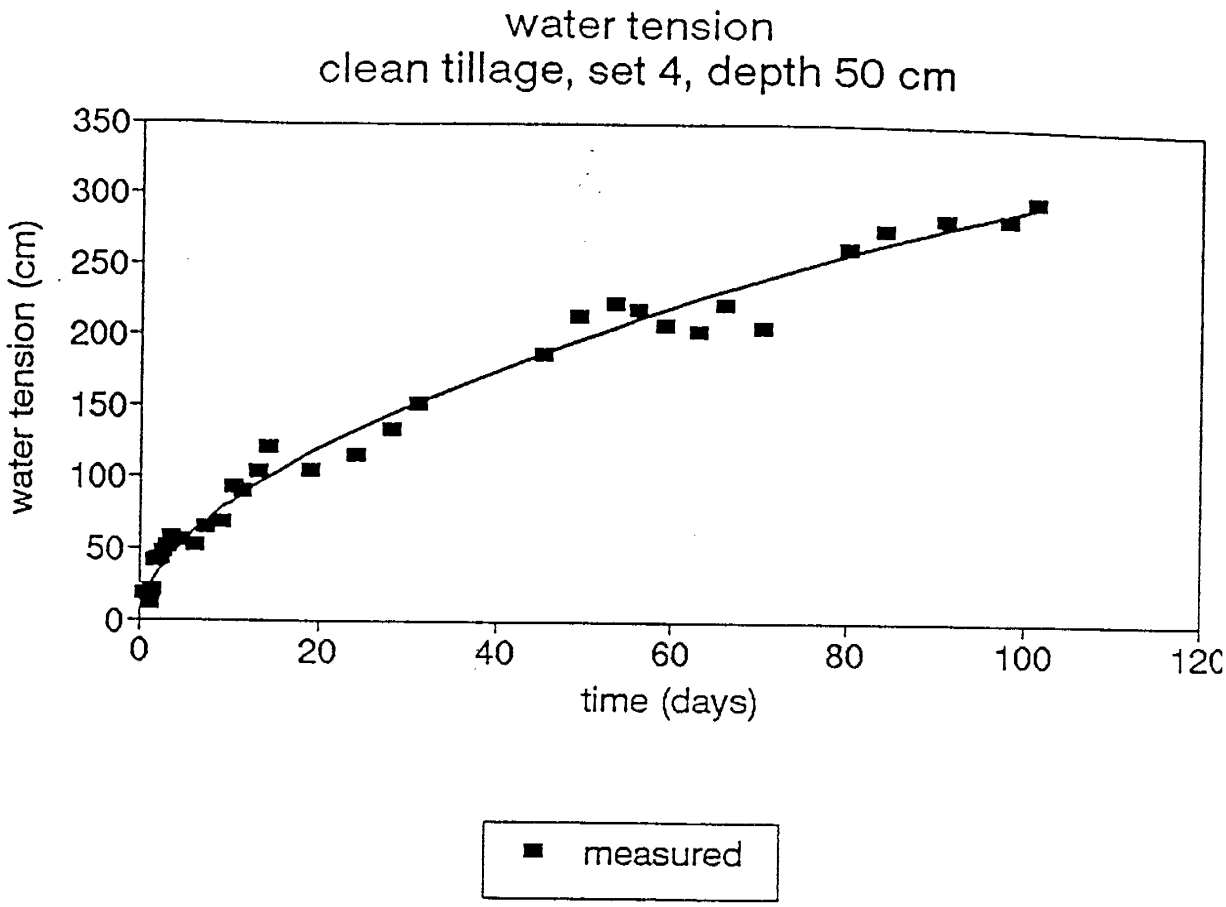

water content
clean tillage, set 3, depth 115 cm
volumetric water content (cm3/cm3)
time (days)
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
0.42
0
20
40
60
80
100
120
measured values

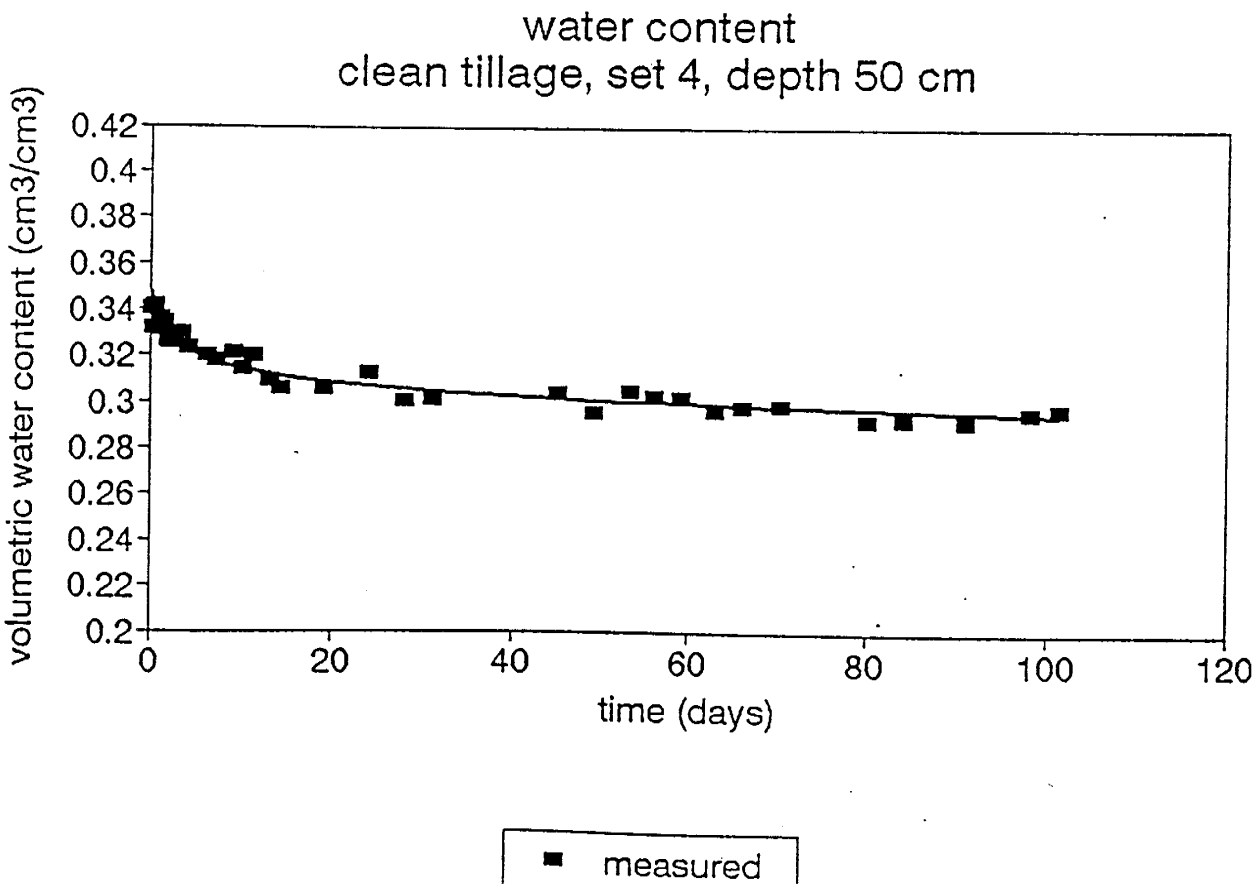

water tension
clean tillage, set 3, depth 165 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured points

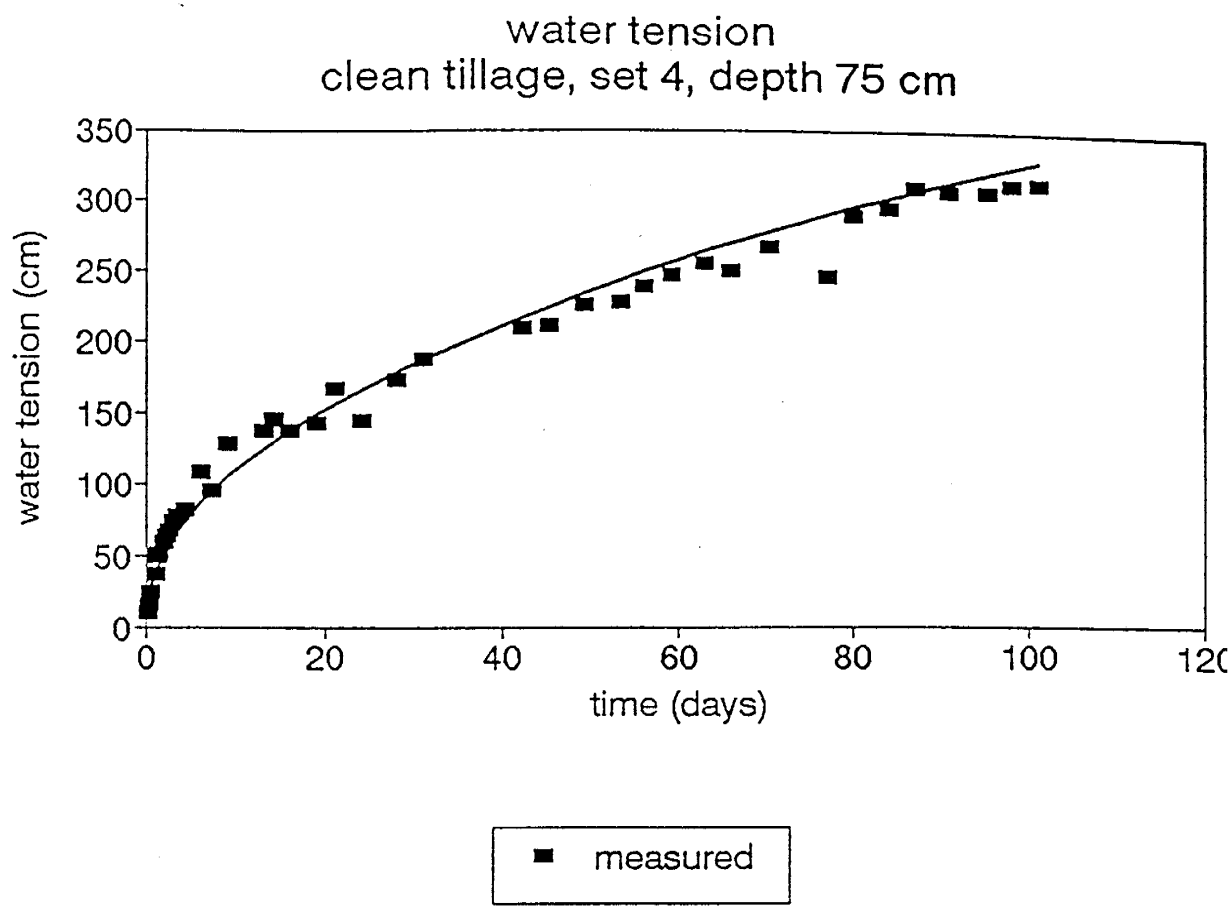

water content
clean tillage, set 3, depth 165 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured values

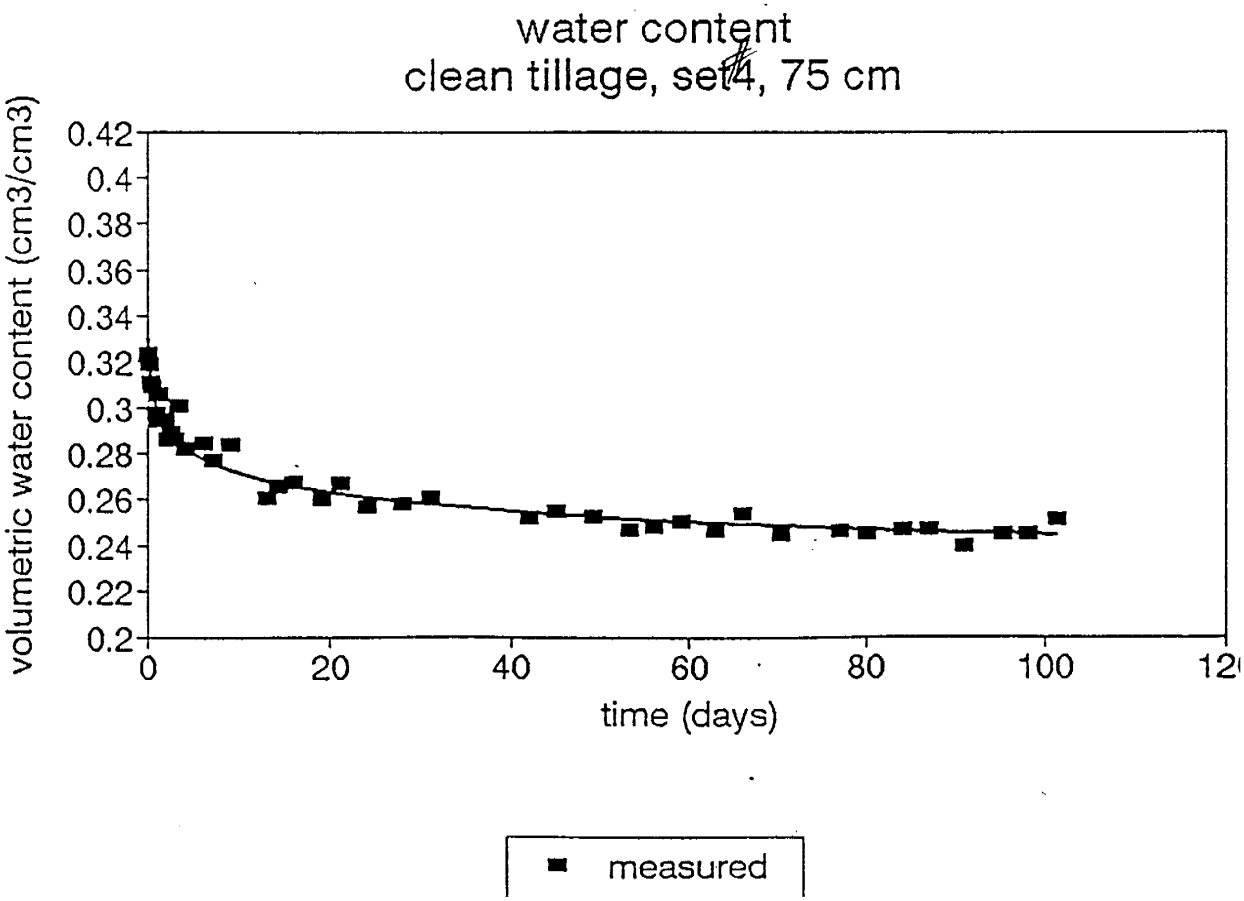

water tension
clean tillage, set 4, depth 25 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

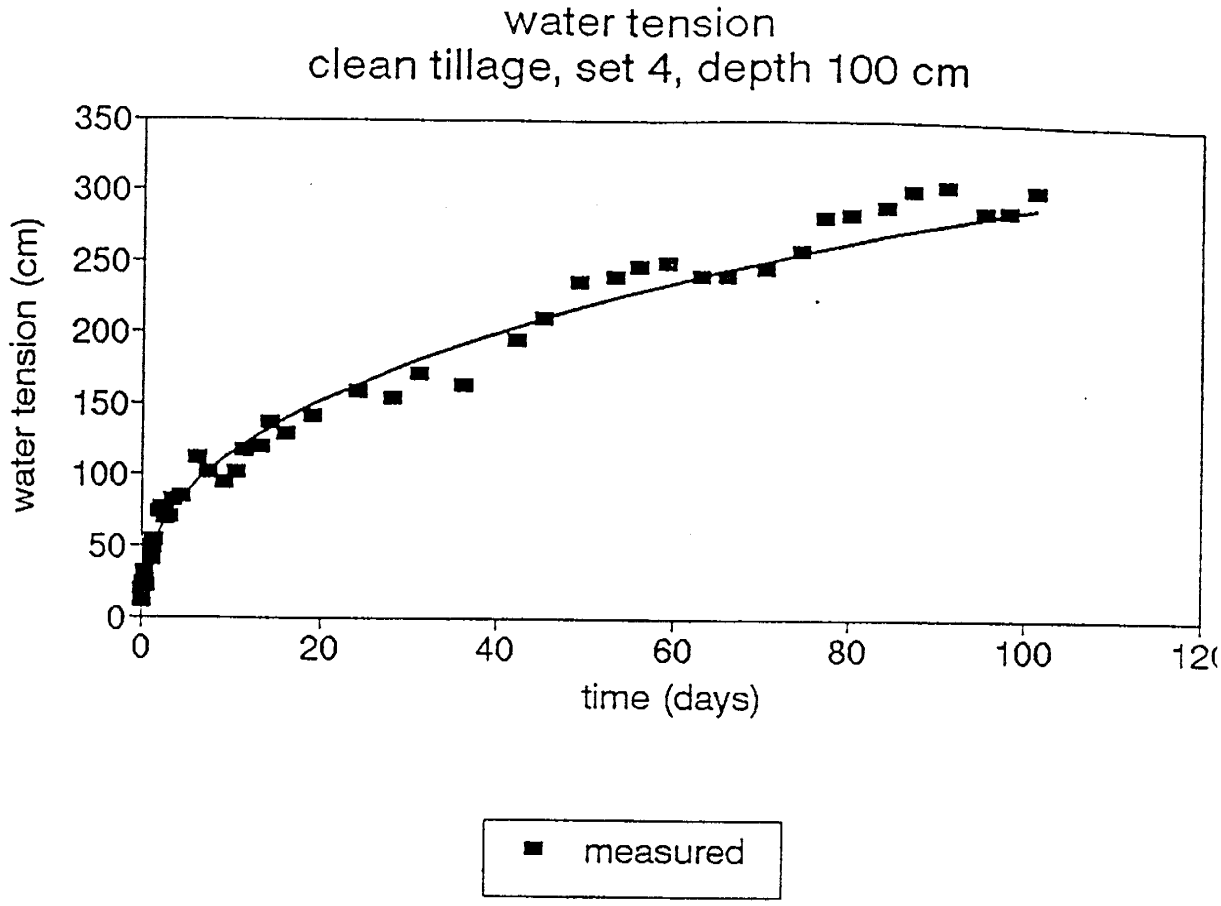

water content
clean tillage, set 4, depth 25 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

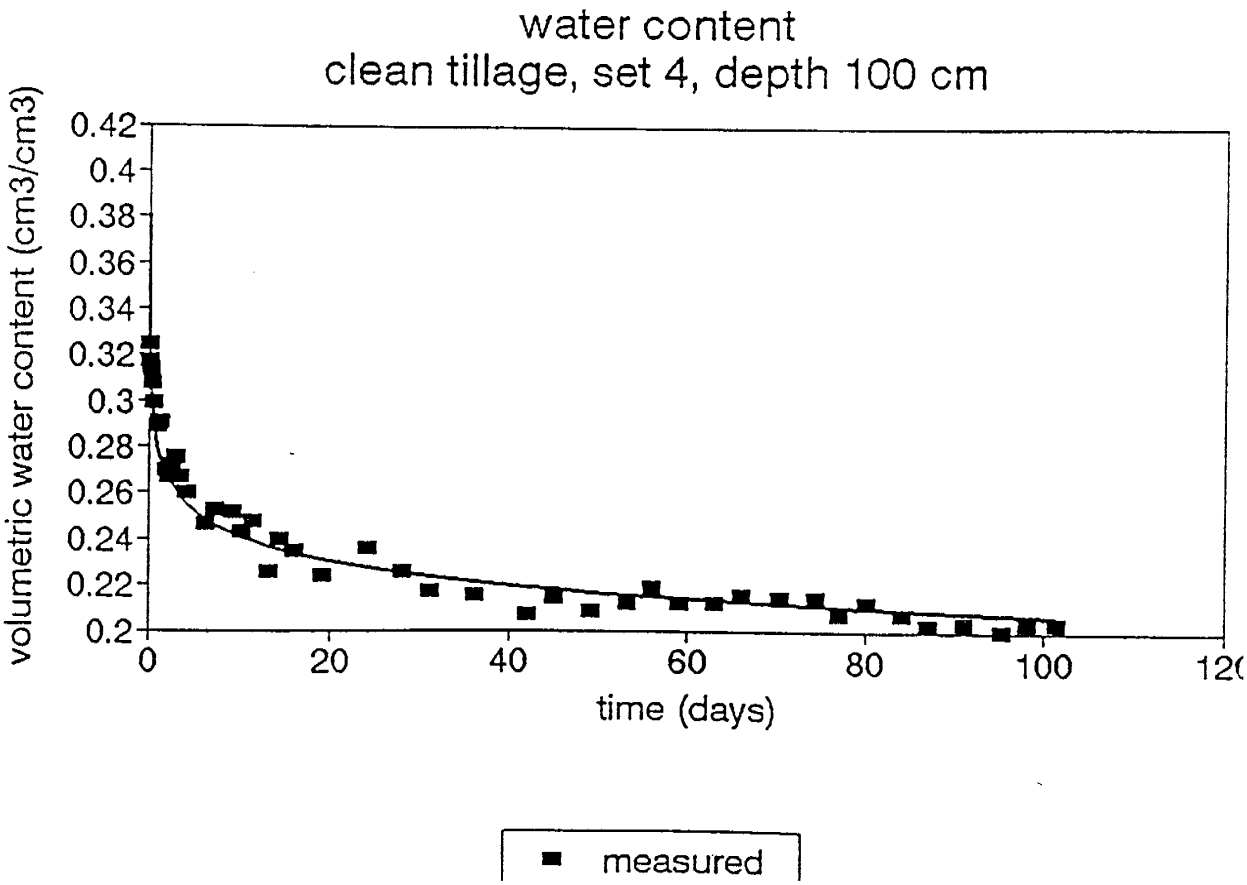

water tension
clean tillage, set 4, depth 50 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

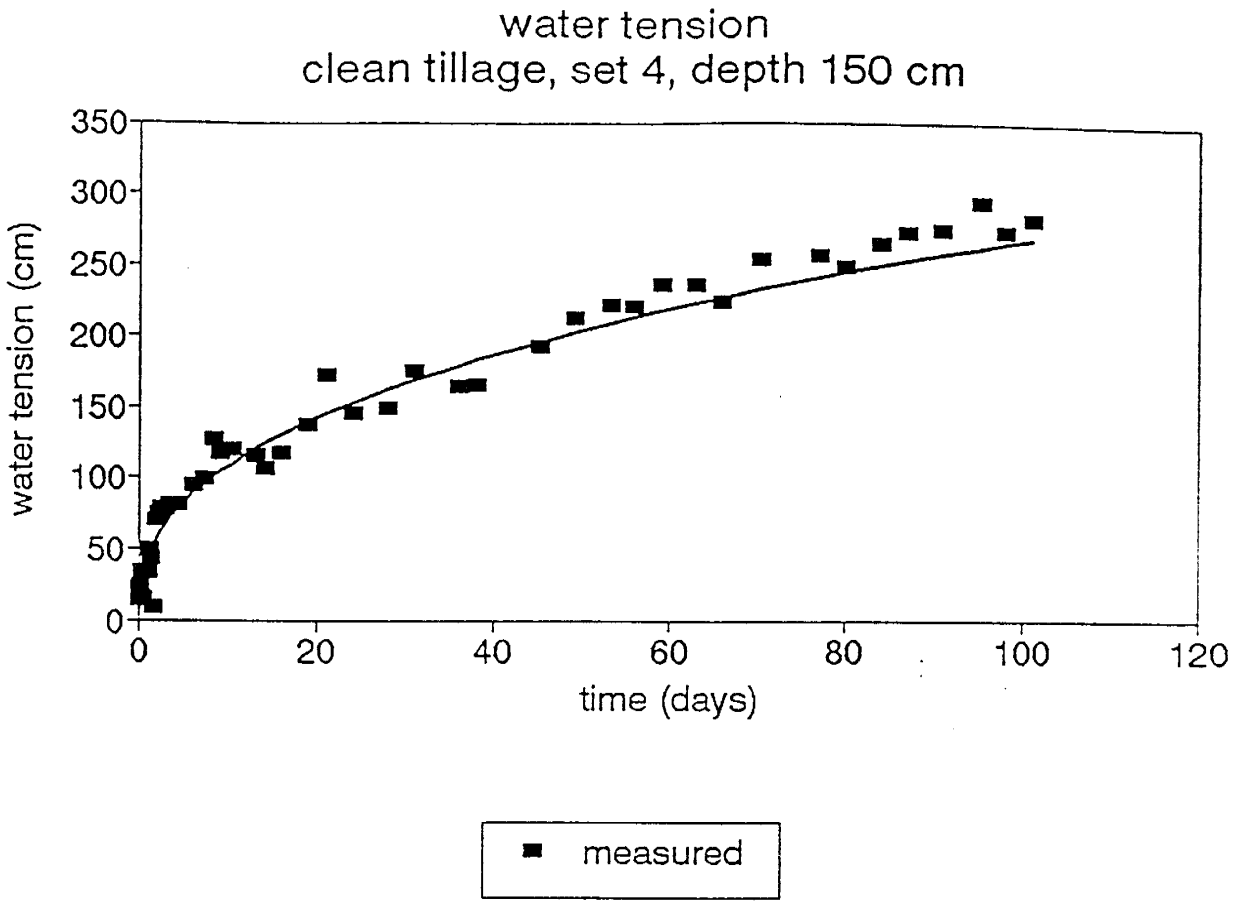

water content
clean tillage, set 4, depth 50 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

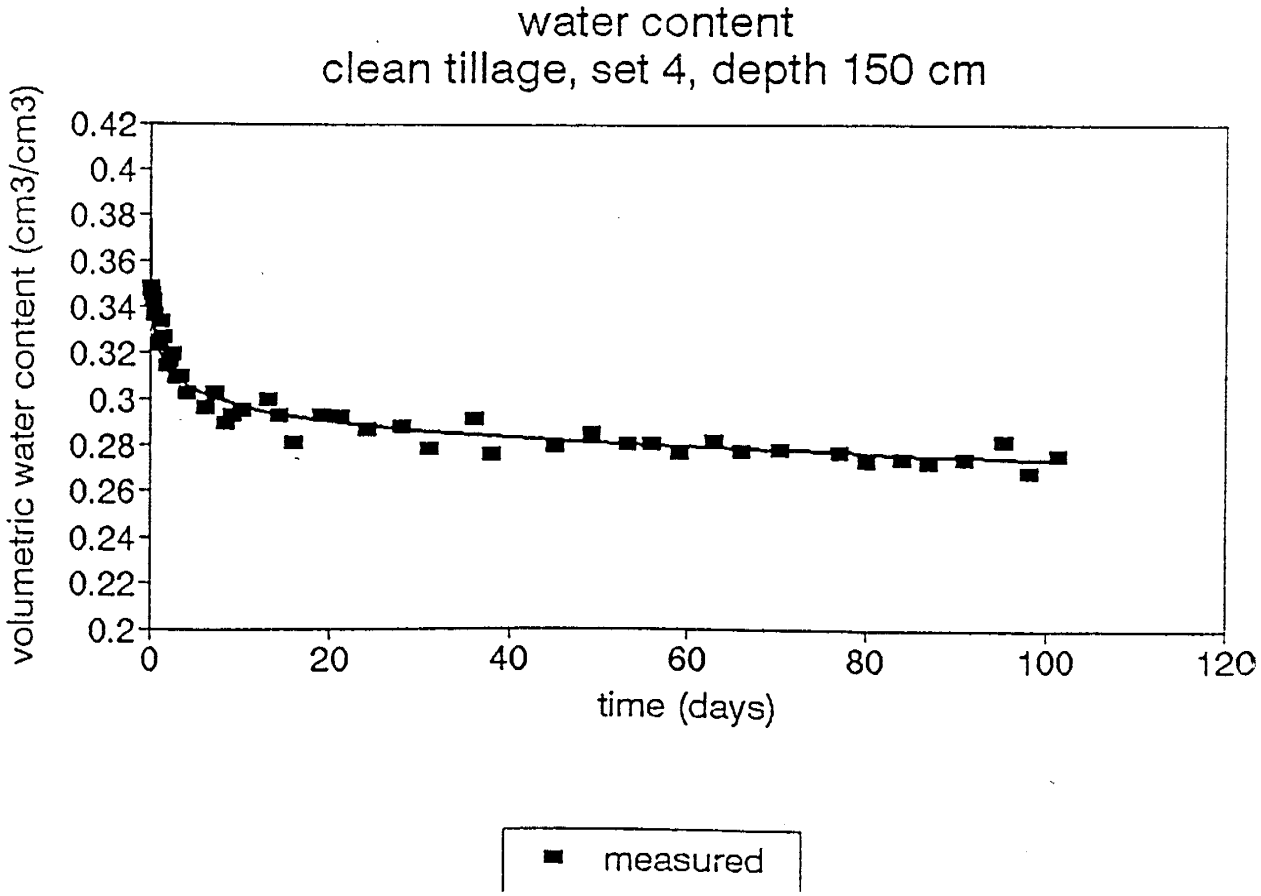

water tension
clean tillage, set 4, depth 75 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

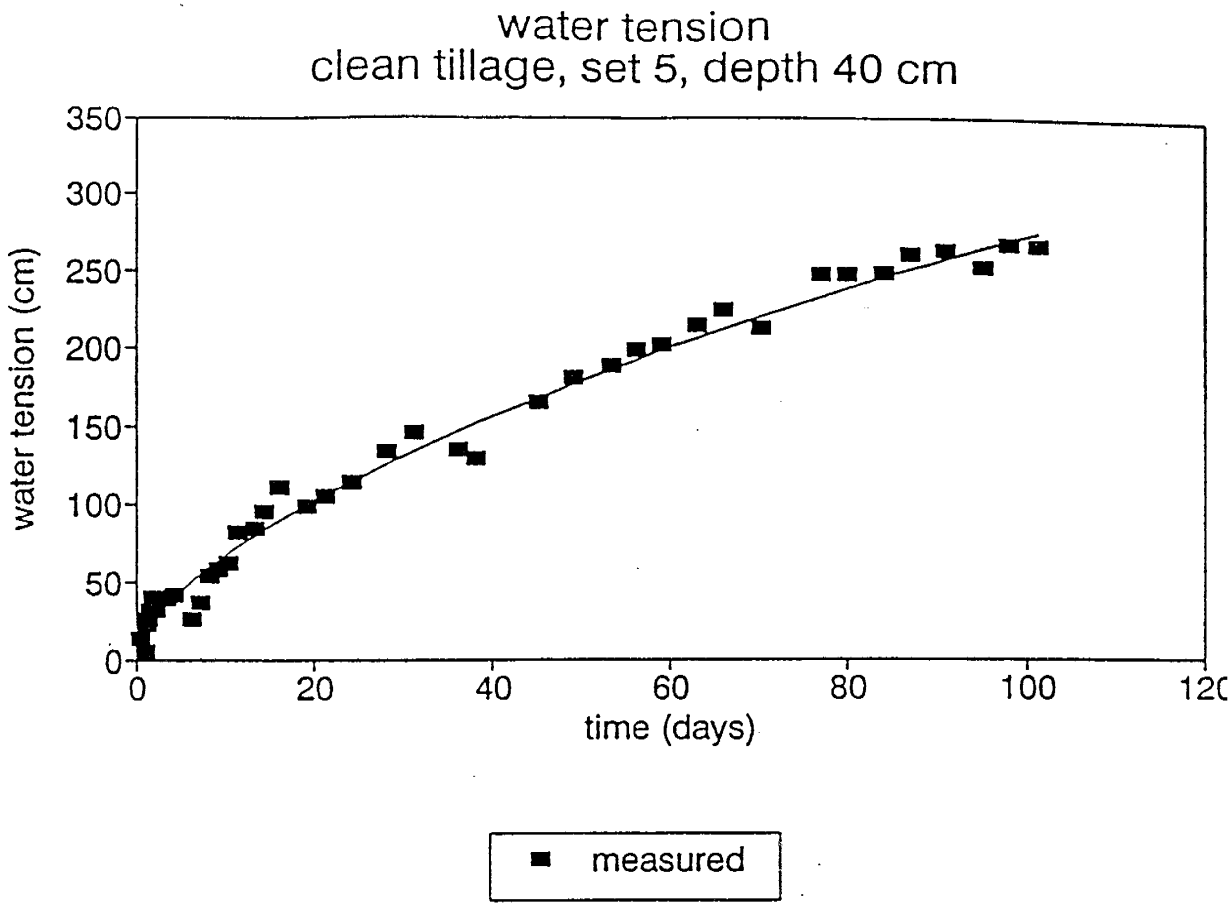

water content
clean tillage, set 4, 75 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

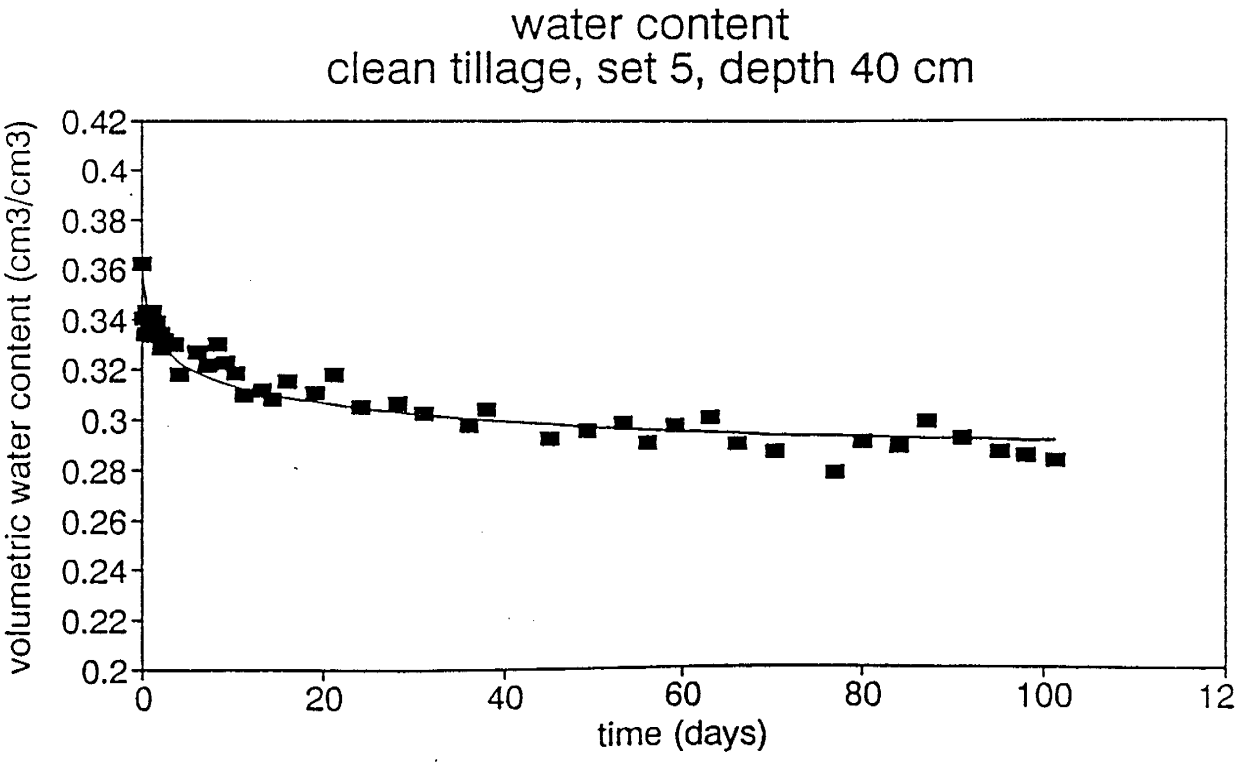

water tension
clean tillage, set 4, depth 100 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
time (days)
measured

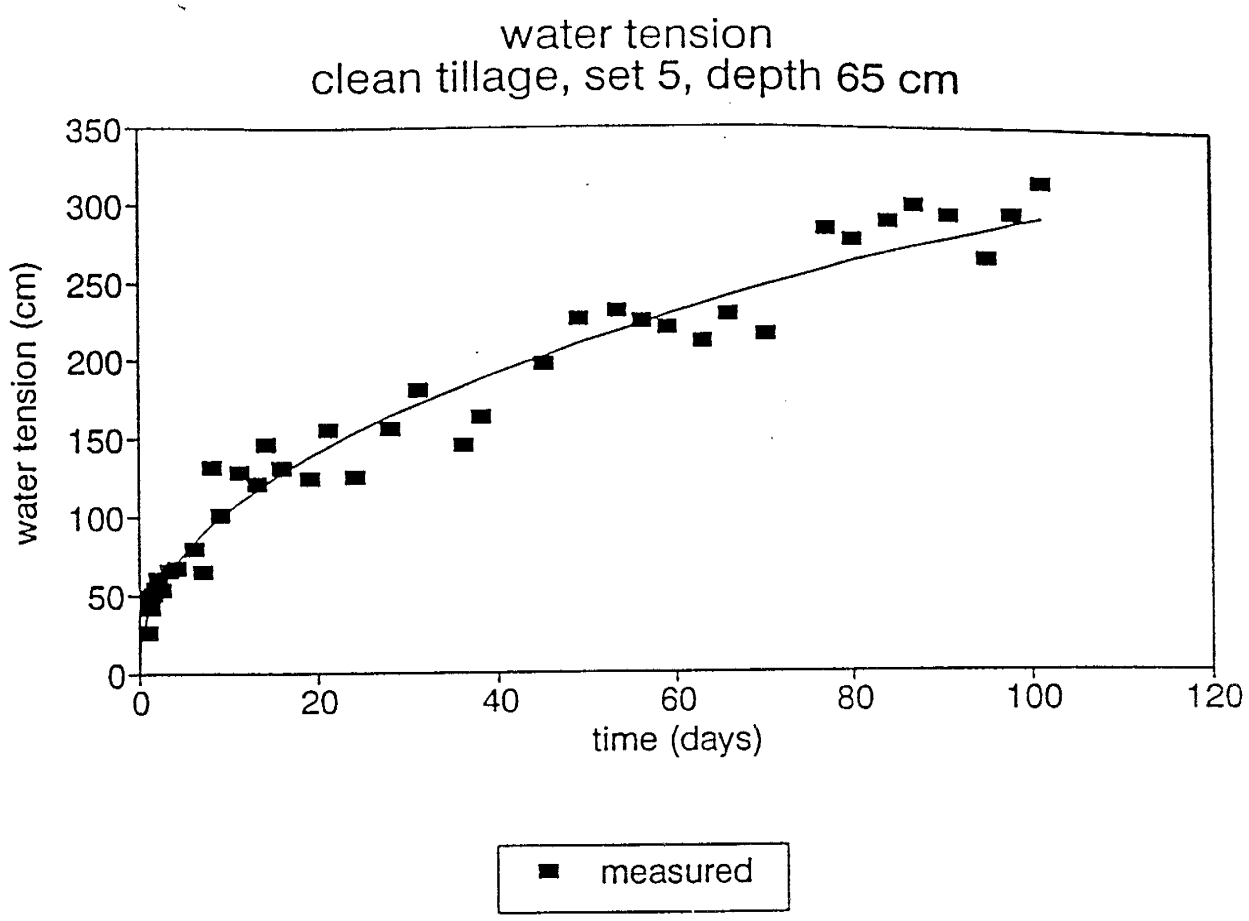

water content
clean tillage, set 4, depth 100 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
time (days)
measured

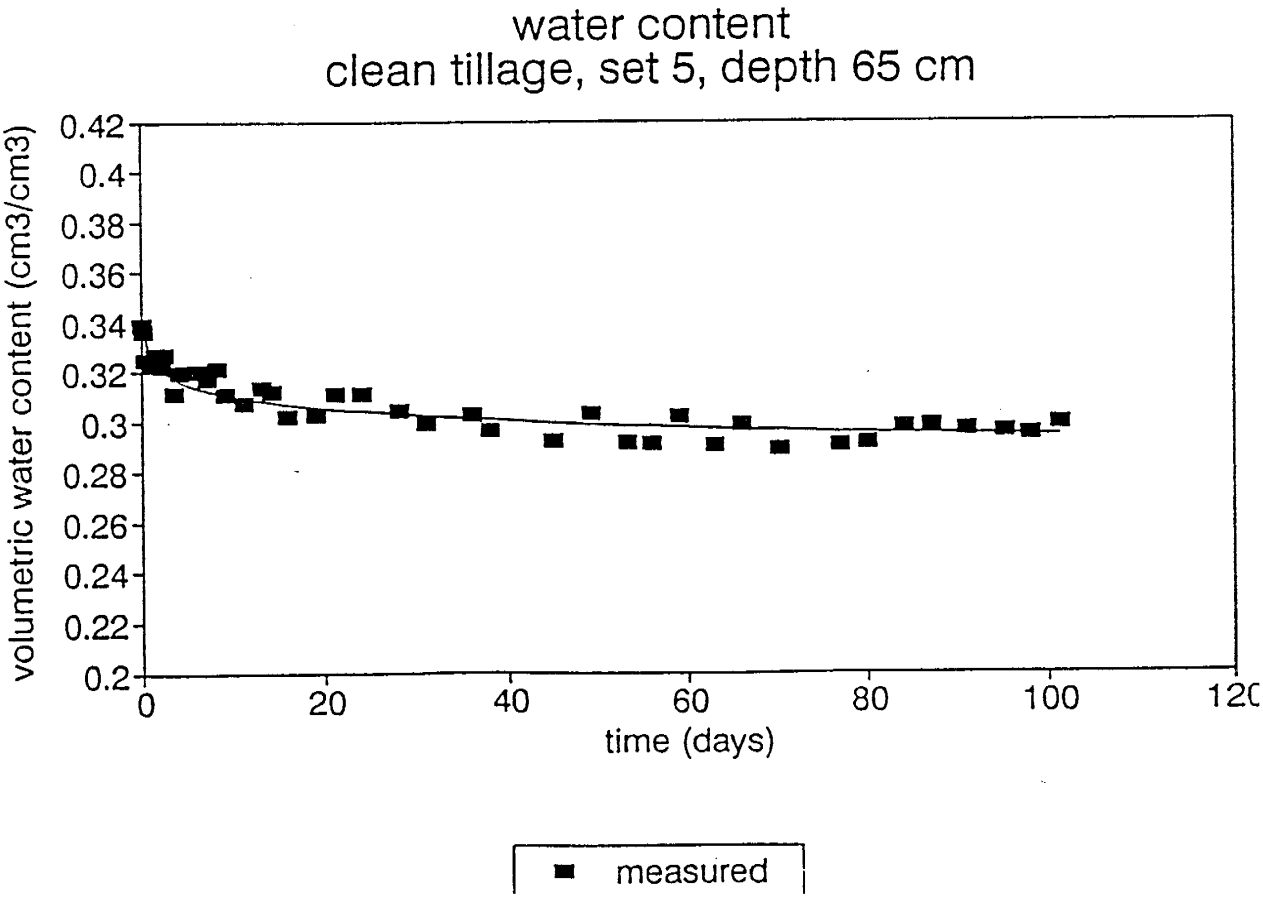

water tension
clean tillage, set 4, depth 150 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

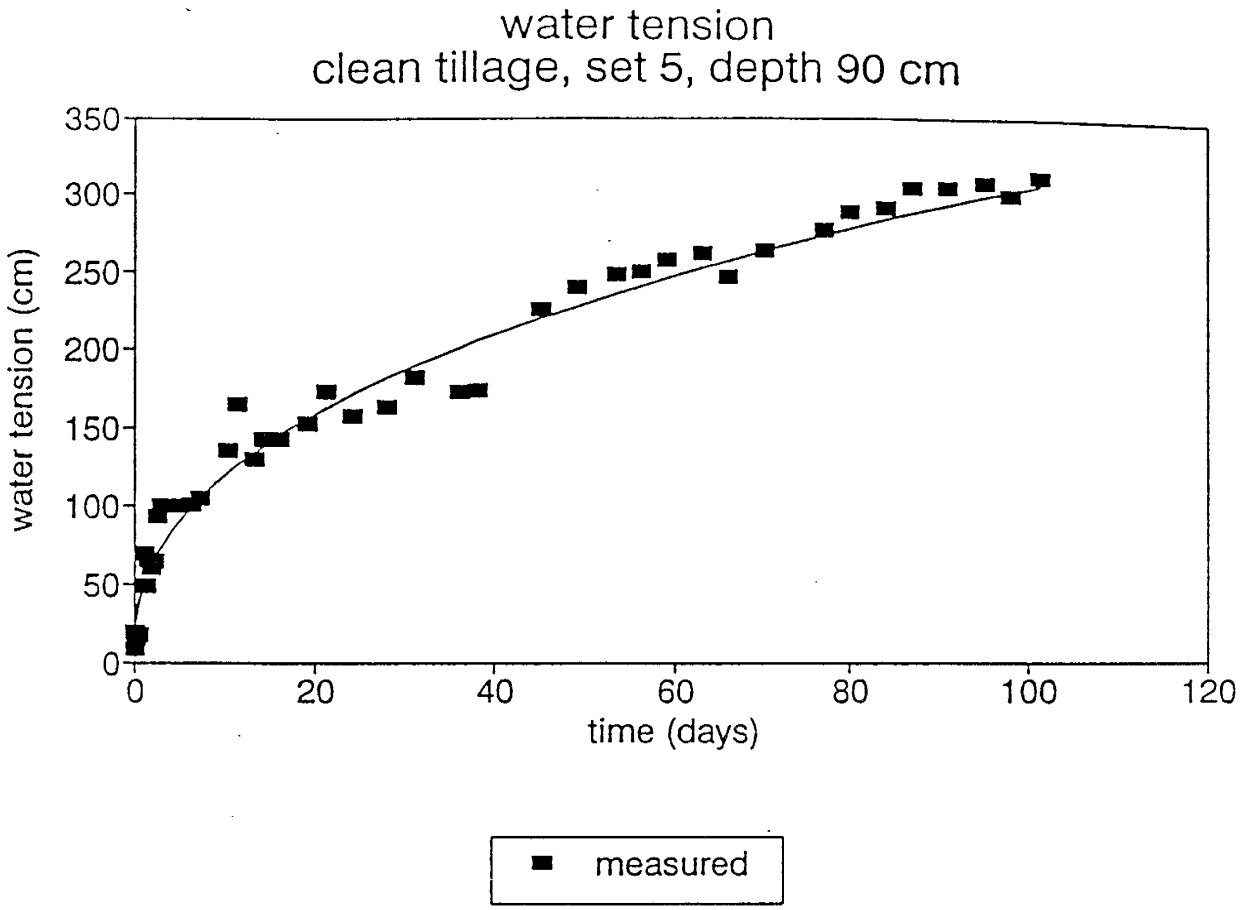

water content
clean tillage, set 4, depth 150 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

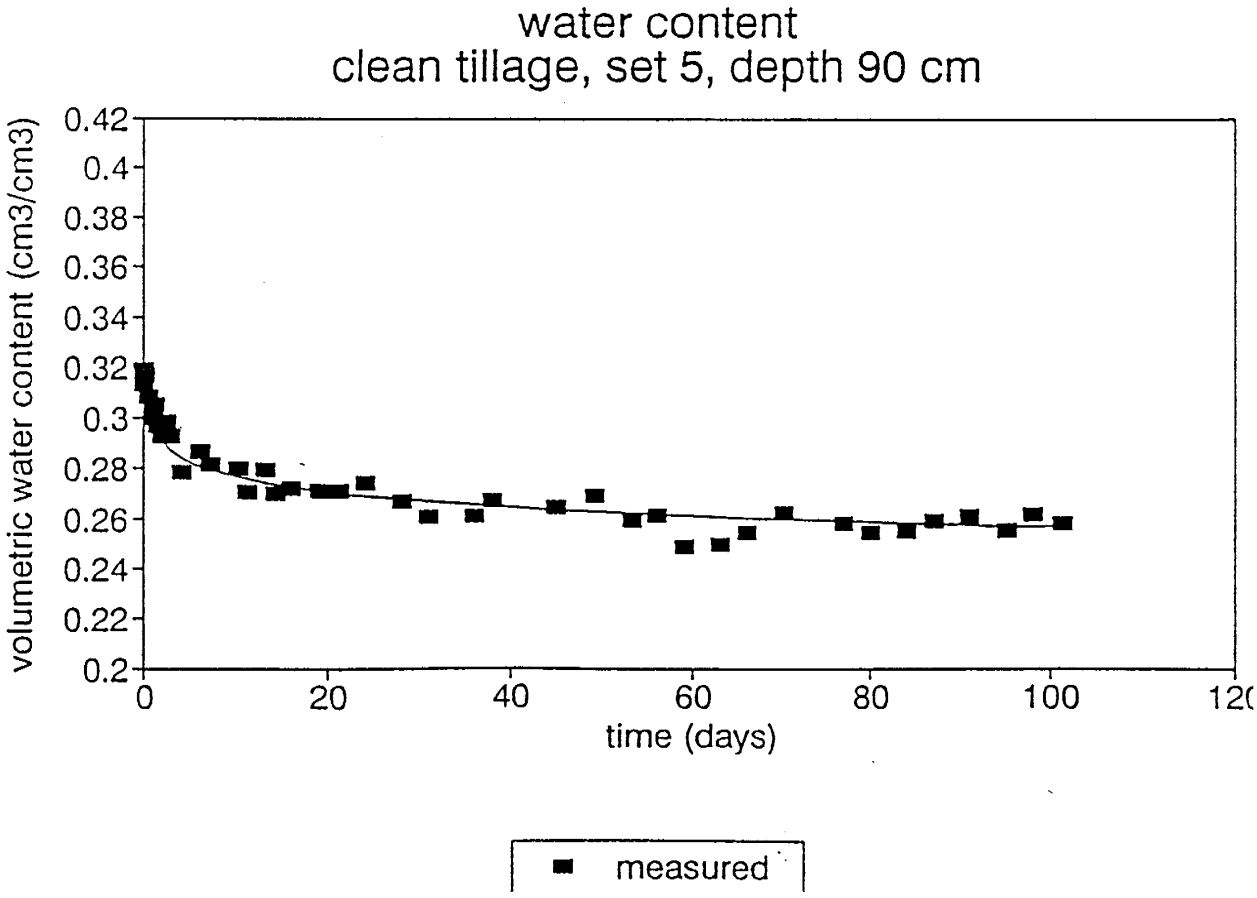

water tension
clean tillage, set 5, depth 40 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

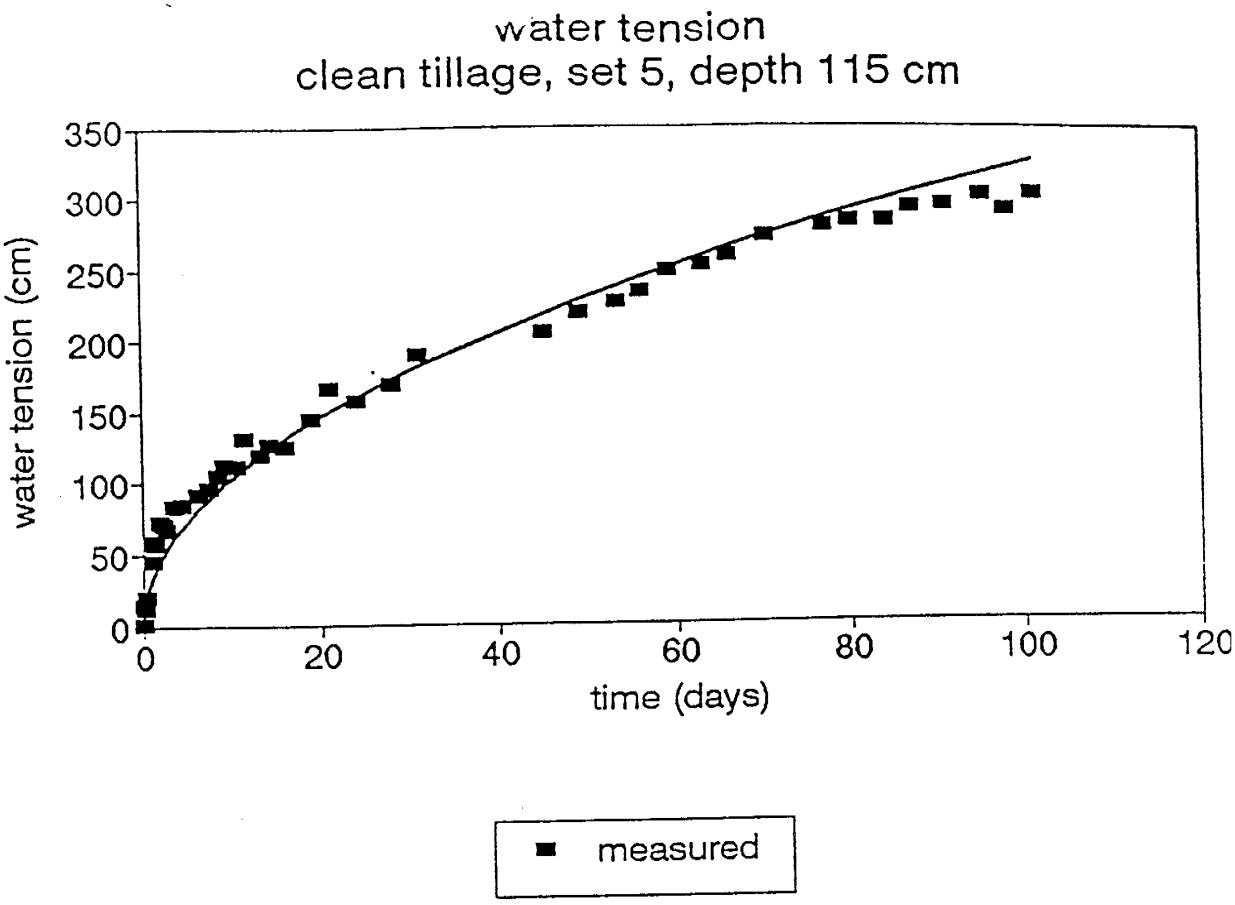

water content
clean tillage, set 5, depth 40 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
12
time (days)
measured

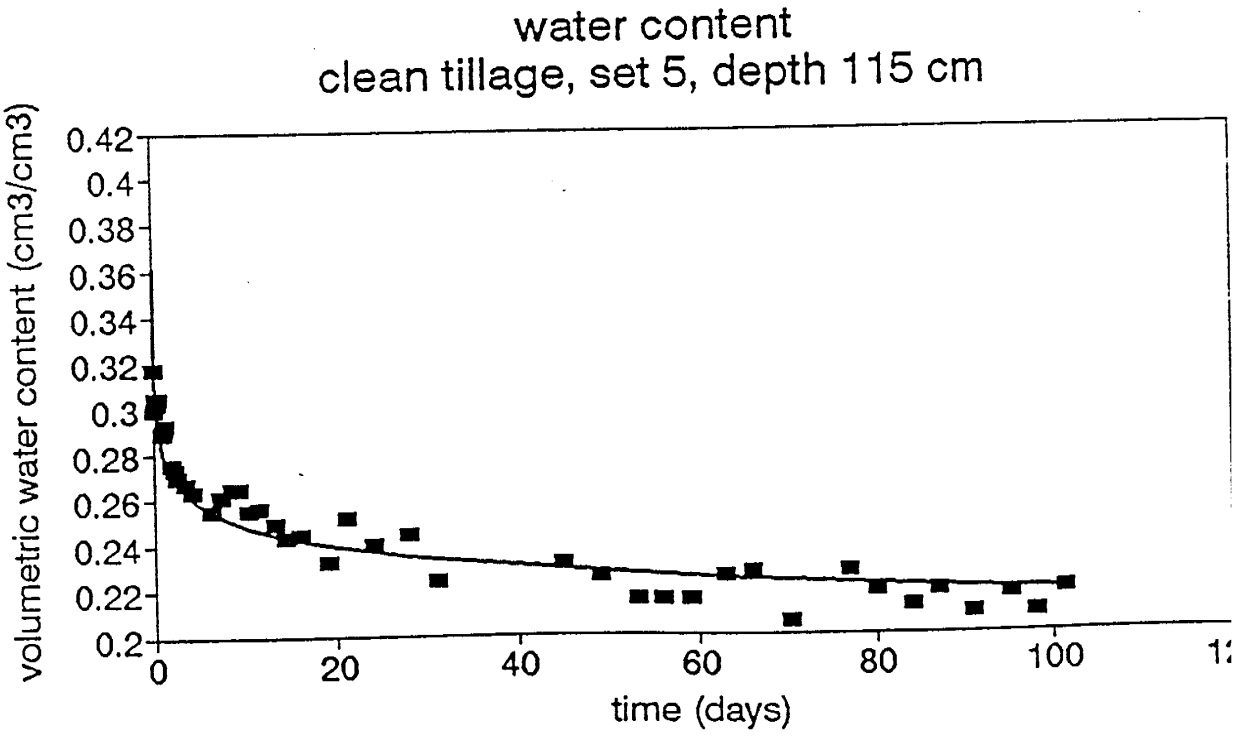

water tension
clean tillage, set 5, depth 65 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

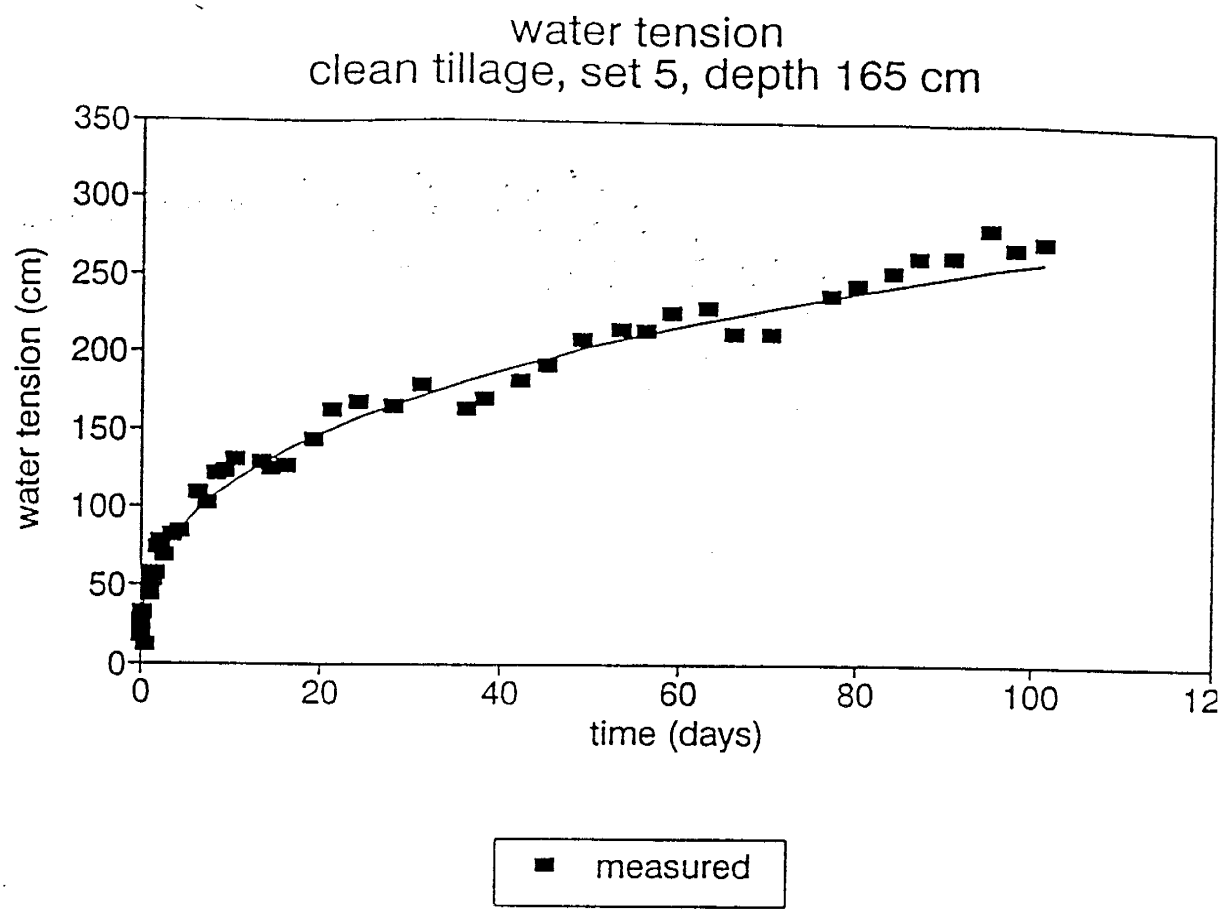

water content
clean tillage, set 5, depth 65 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

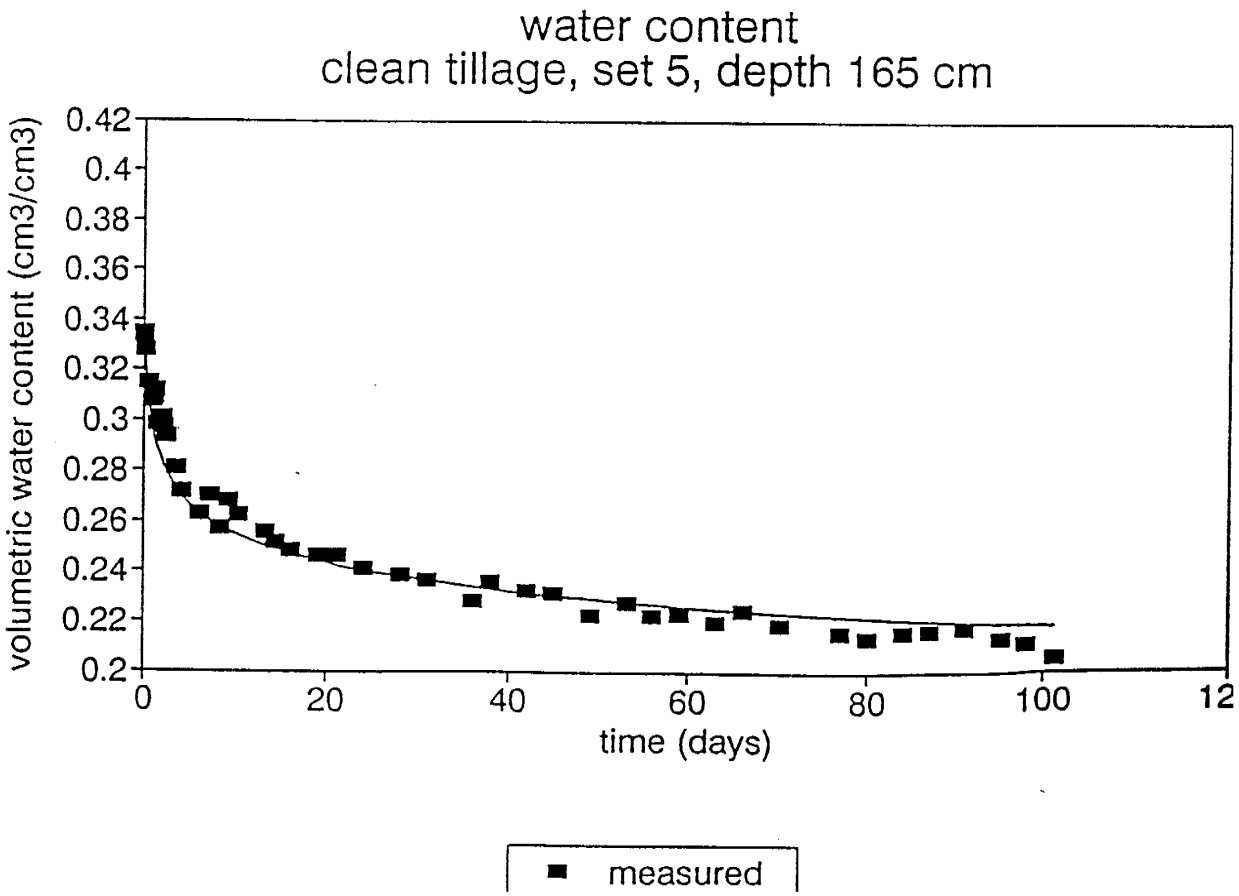

water tension
clean tillage, set 5, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

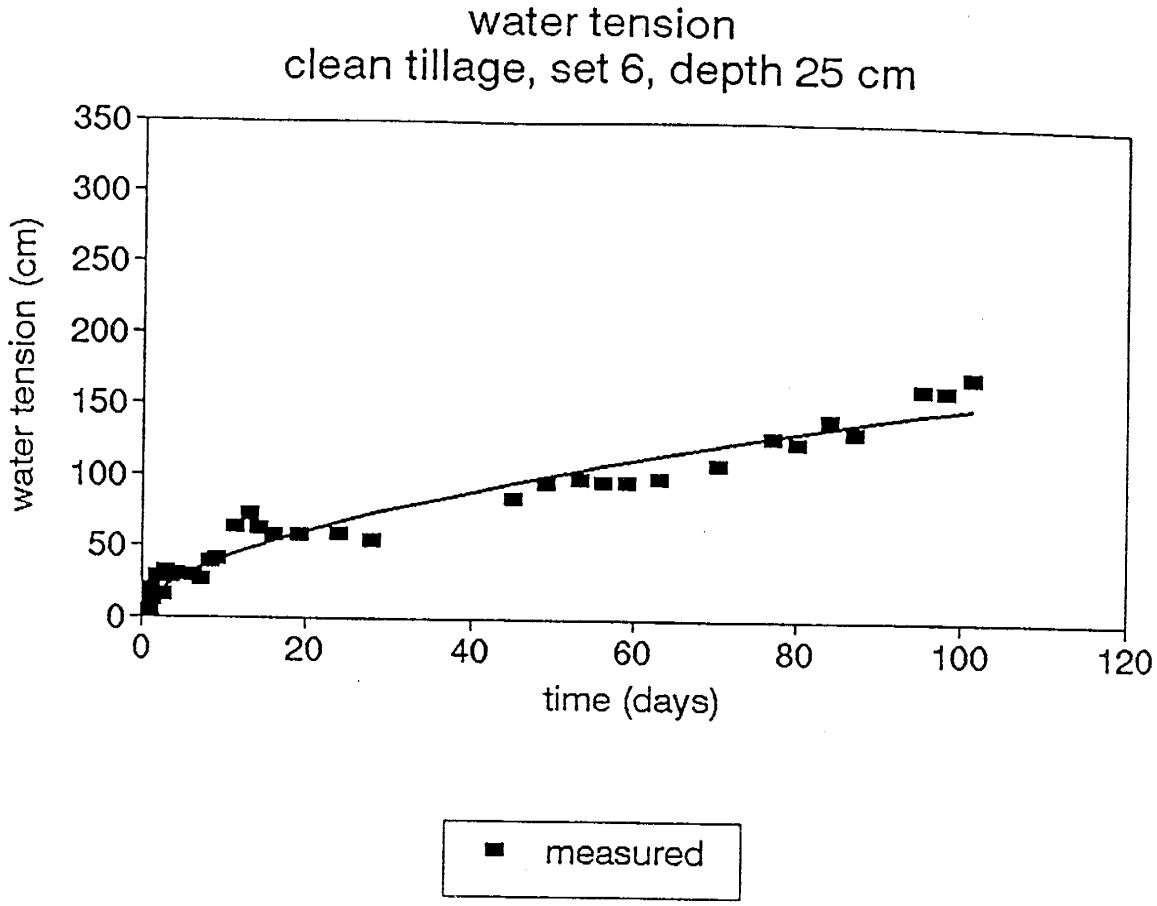

water content
clean tillage, set 5, depth 90 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
time (days)
measured

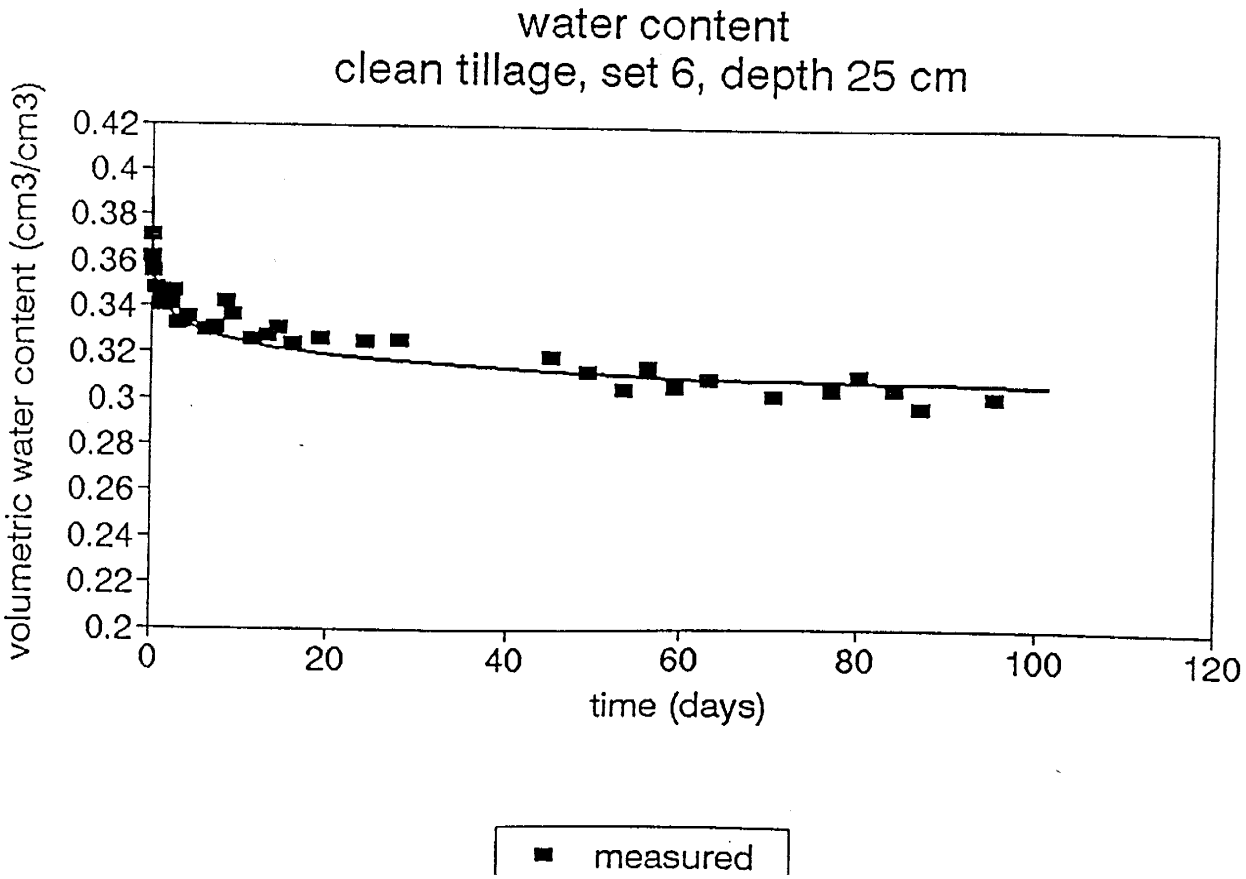

water tension
clean tillage, set 5, depth 115 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

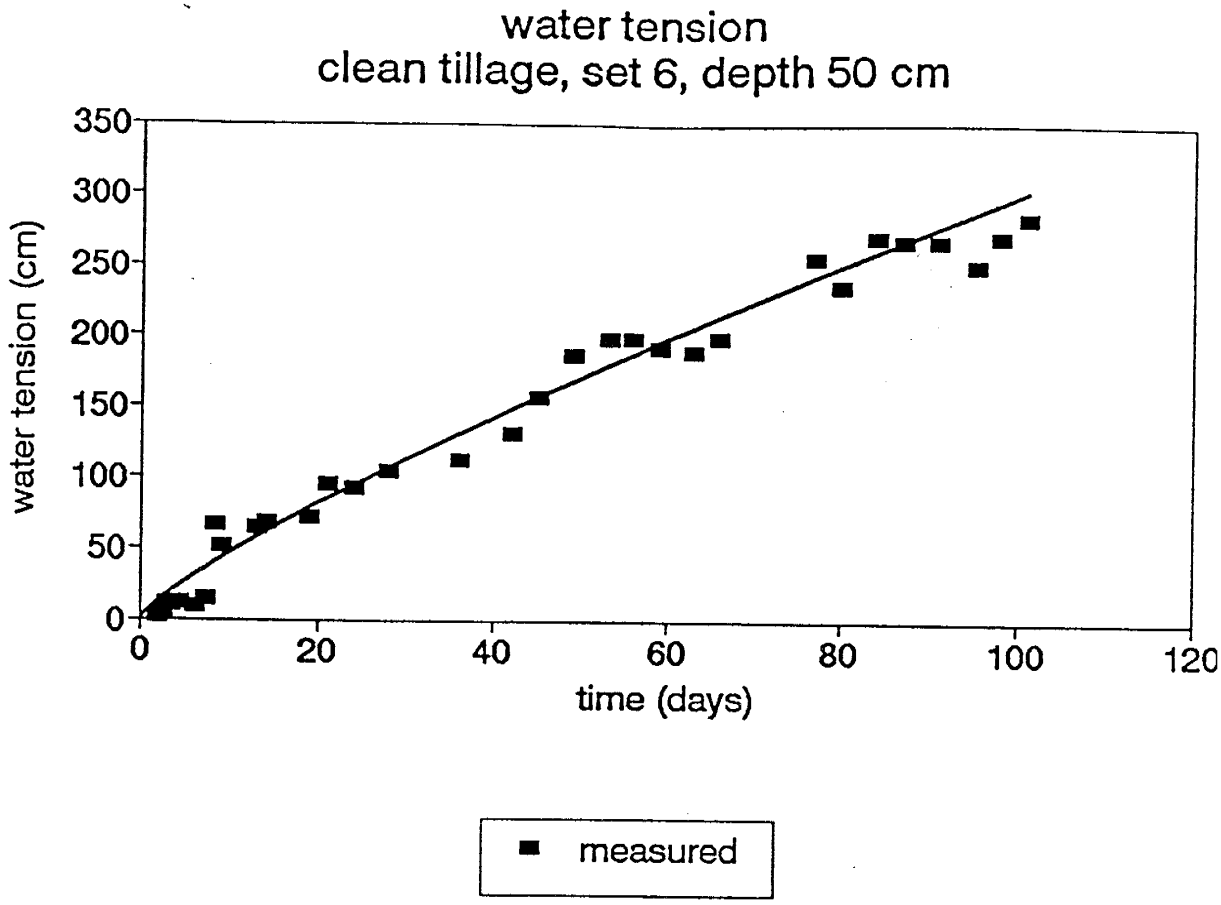

water content
clean tillage, set 5, depth 115 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
time (days)
measured

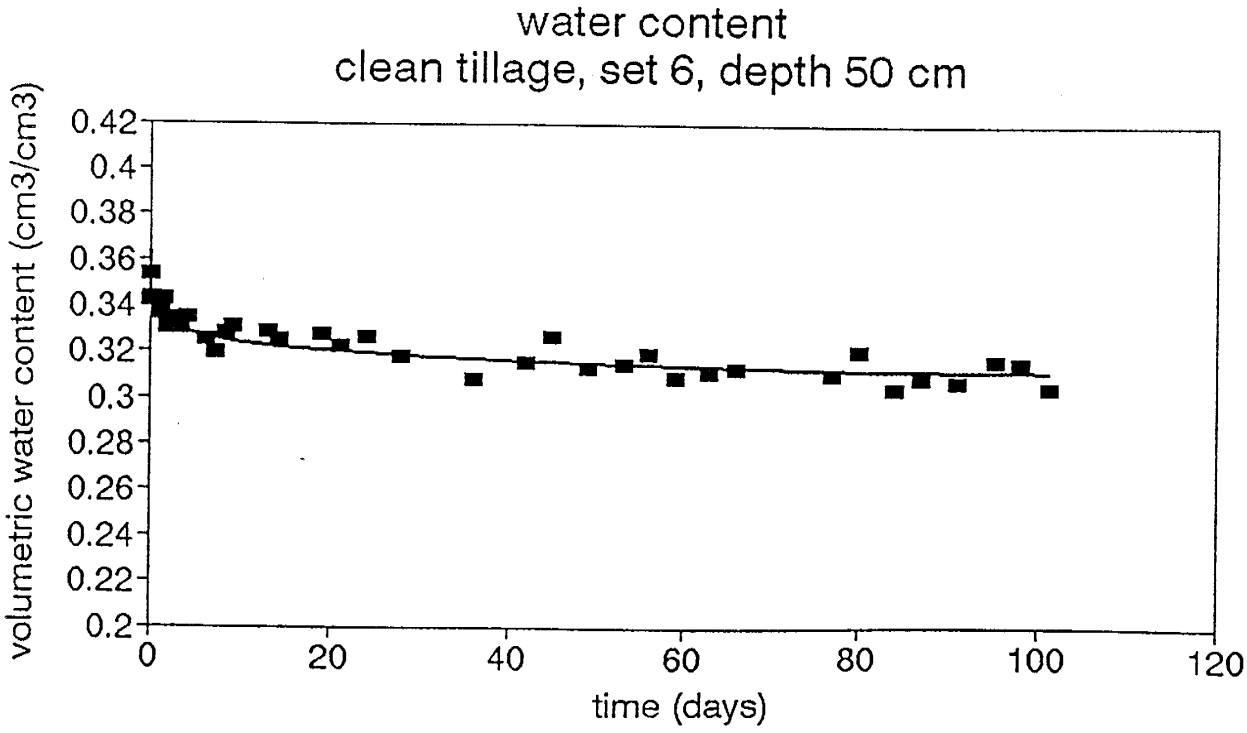

water tension
clean tillage, set 5, depth 165 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
12
time (days)
measured

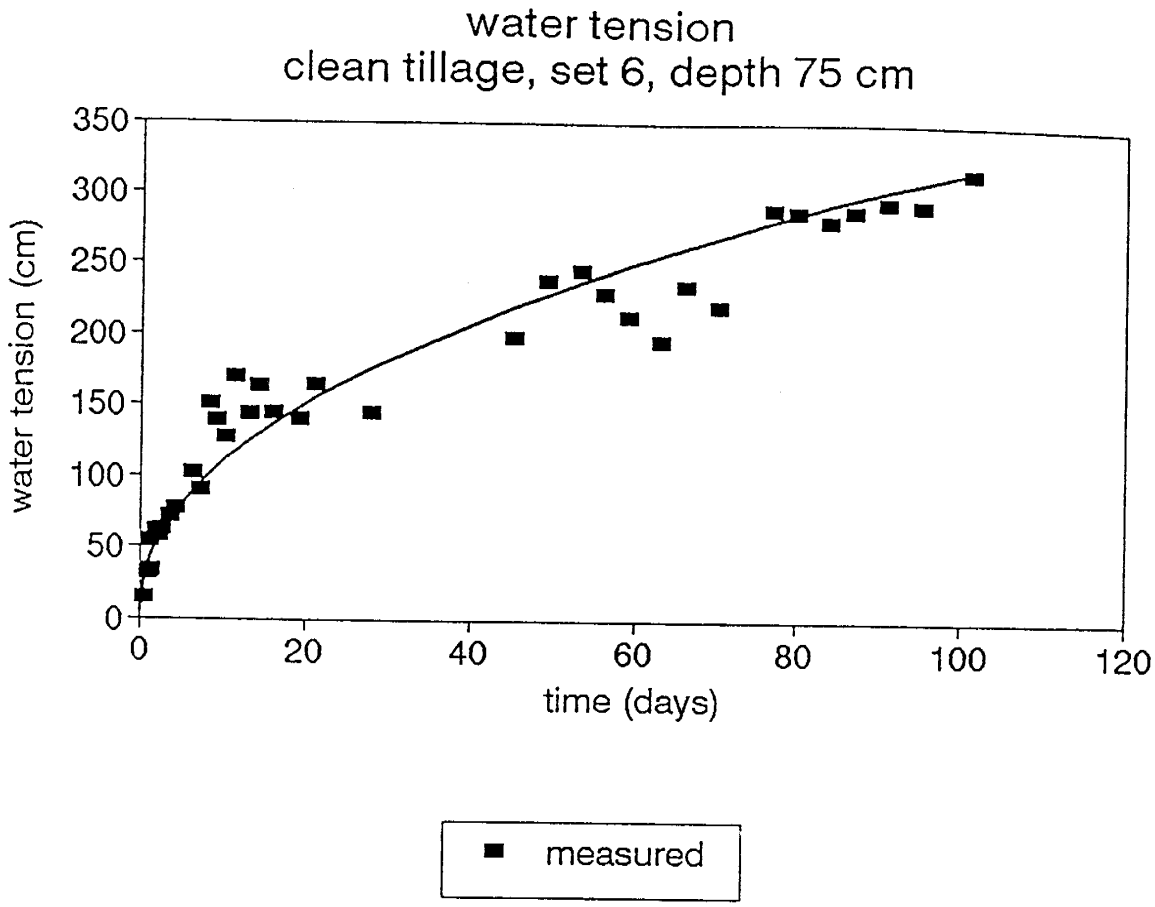

water content
clean tillage, set 5, depth 165 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
12
time (days)
measured

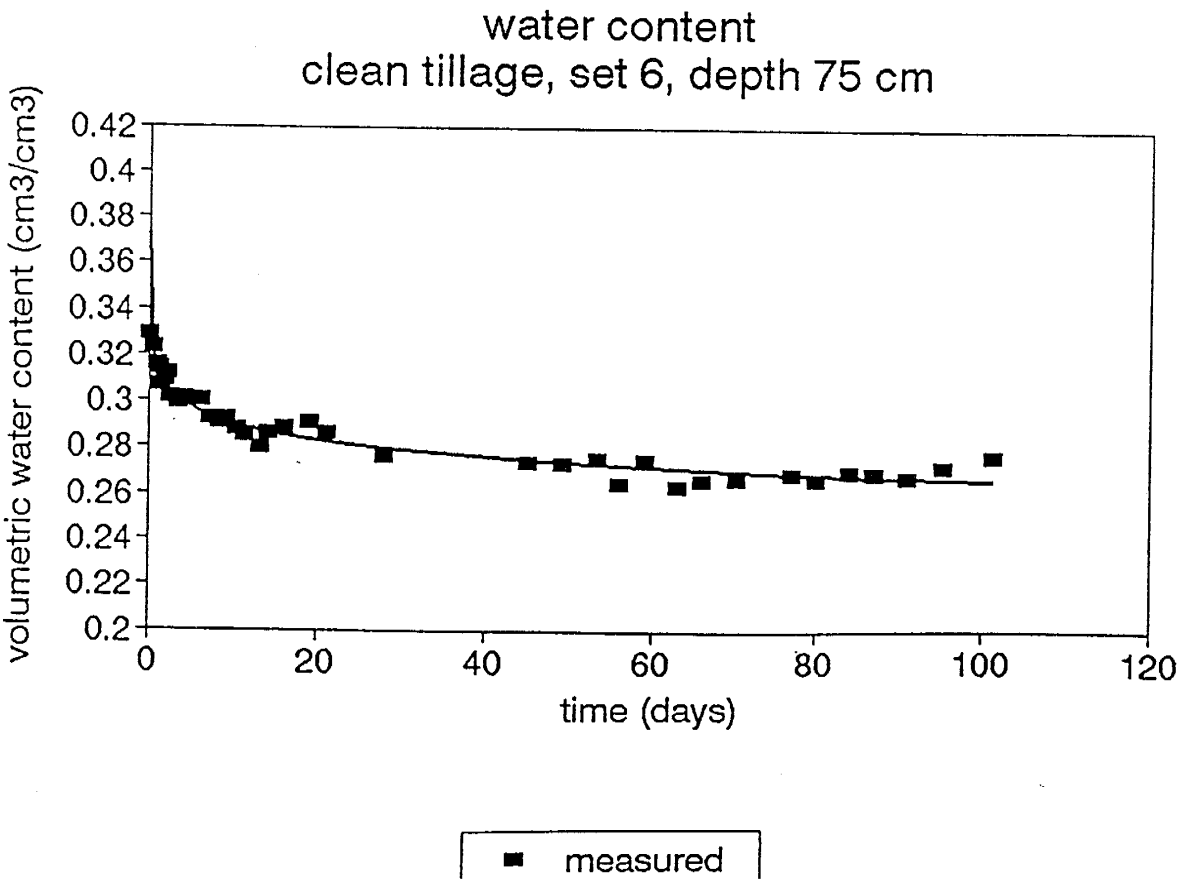

water tension
clean tillage, set 6, depth 25 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

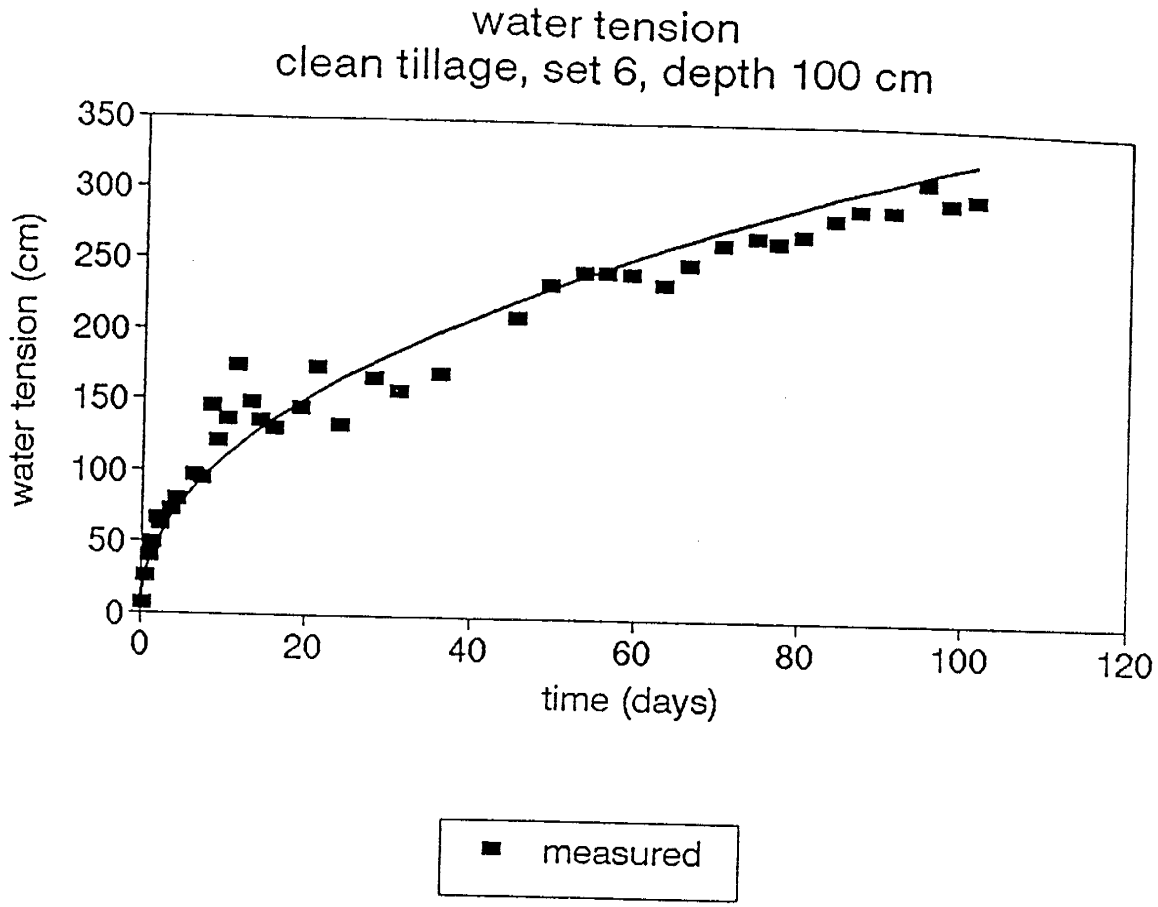

water content
clean tillage, set 6, depth 25 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

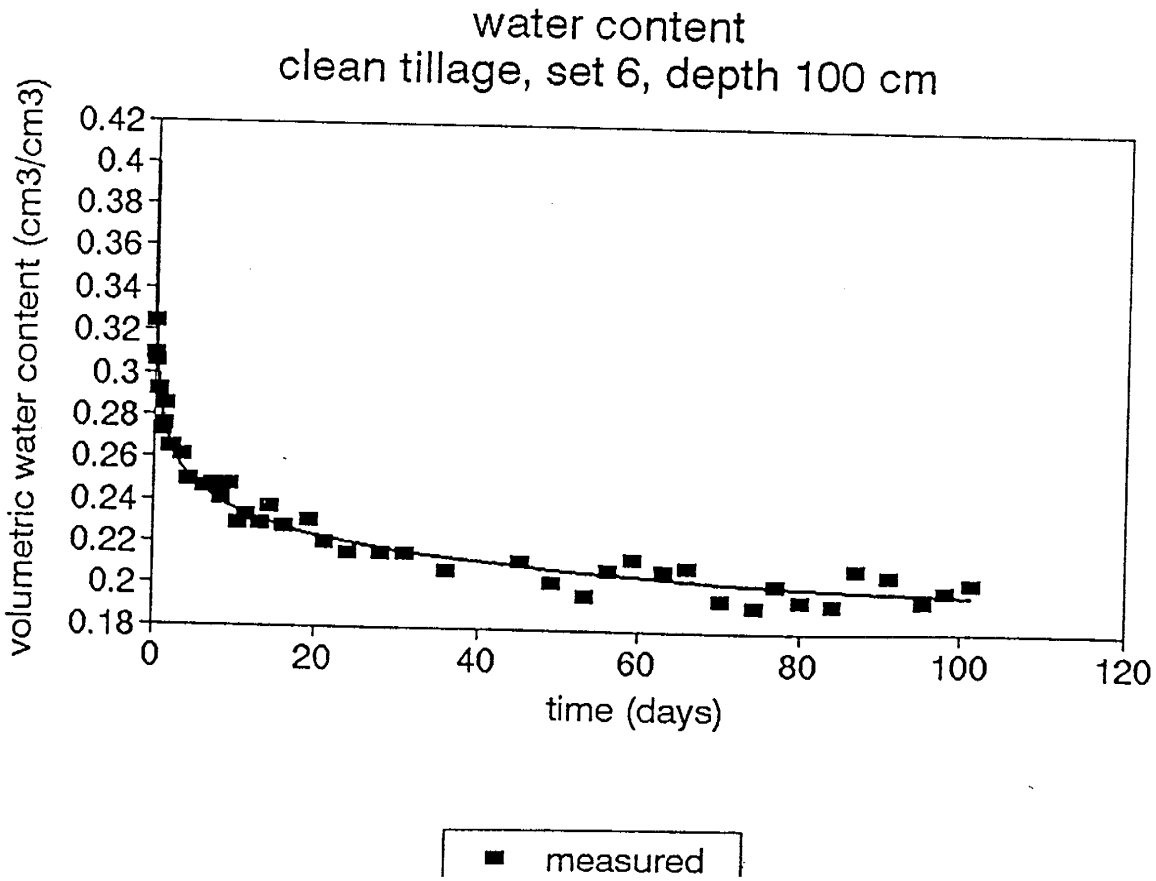

water tension
clean tillage, set 6, depth 50 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

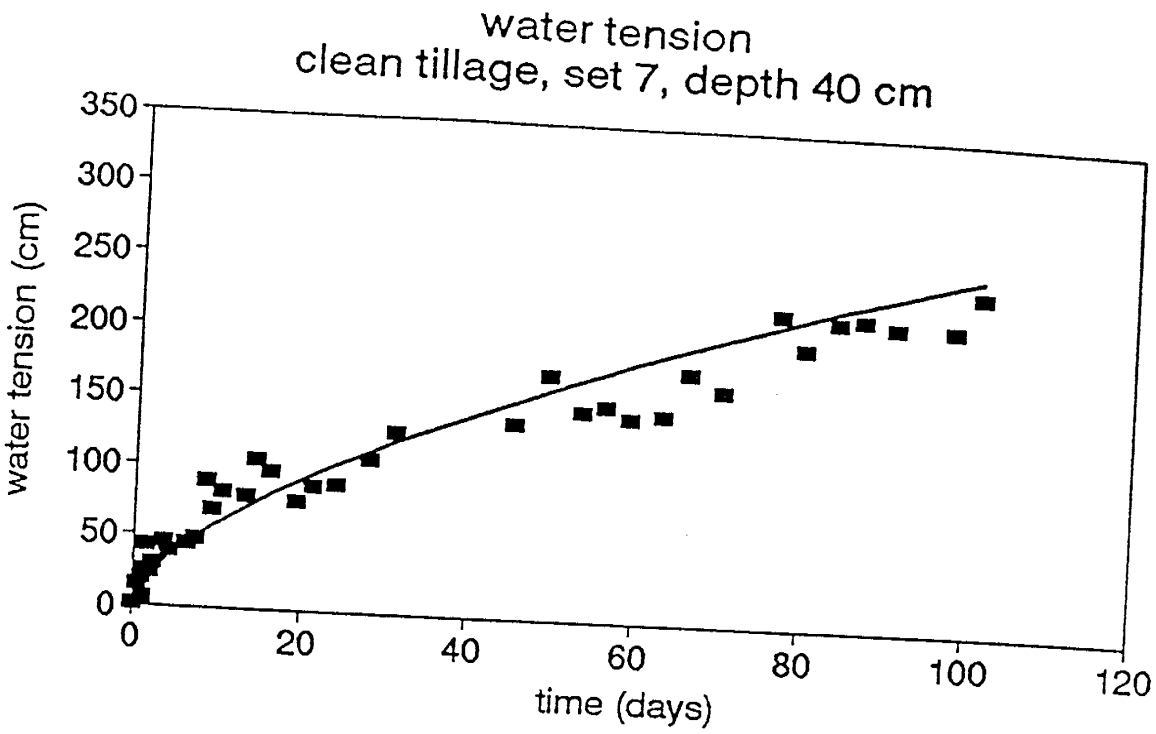

water content
clean tillage, set 6, depth 50 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

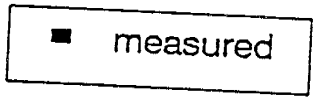

water tension
clean tillage, set 6, depth 75 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

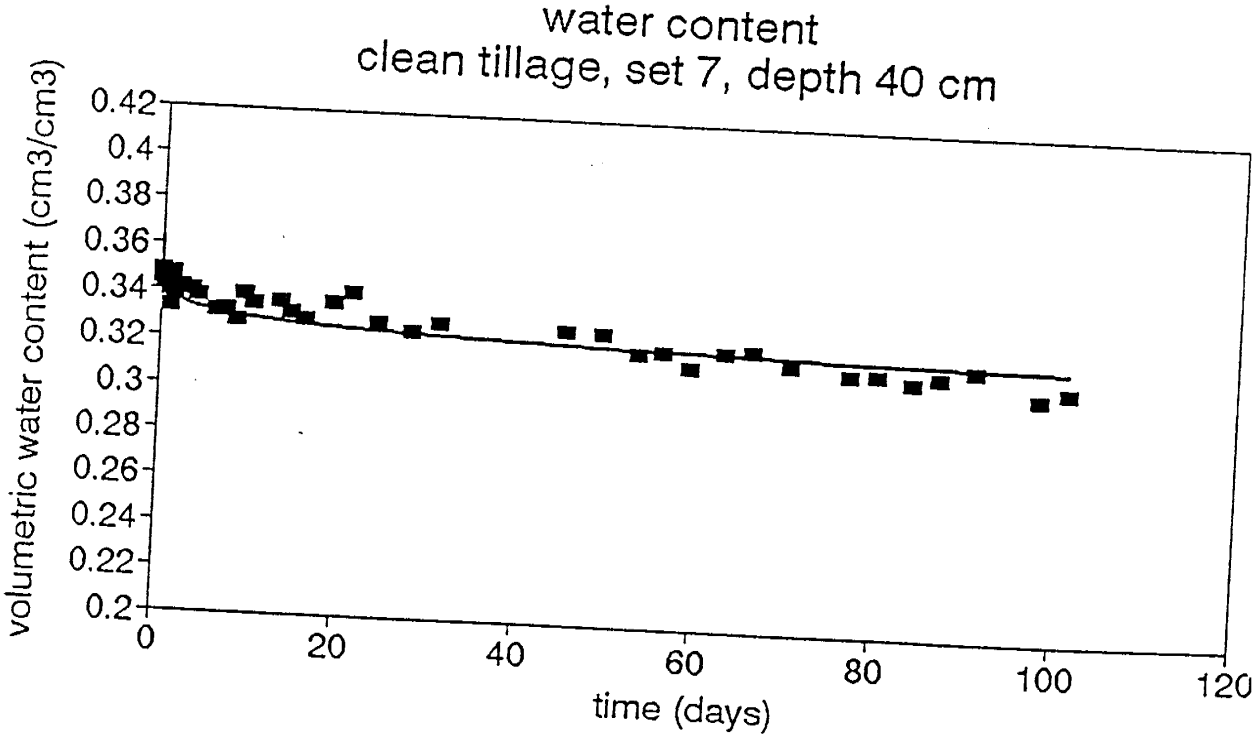

water content
clean tillage, set 6, depth 75 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

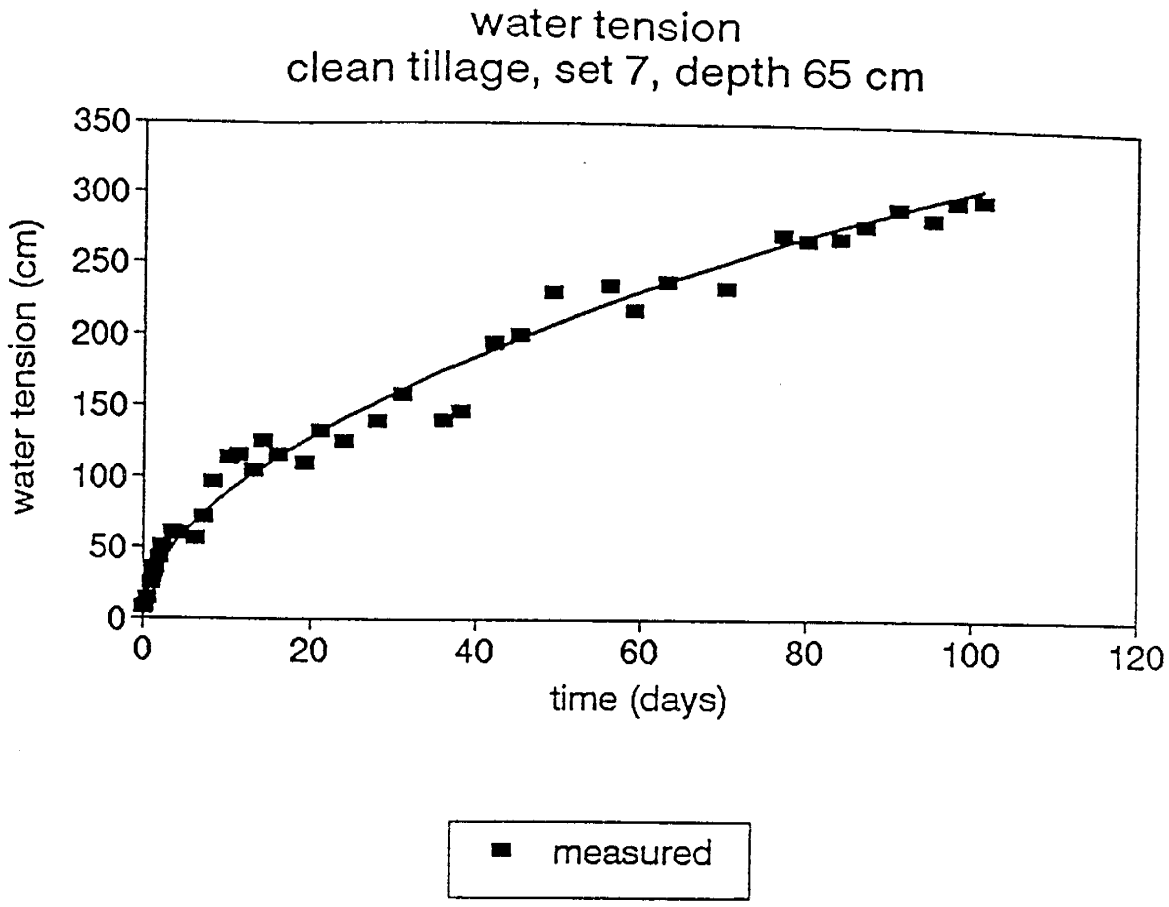

water tension
clean tillage, set 6, depth 100 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

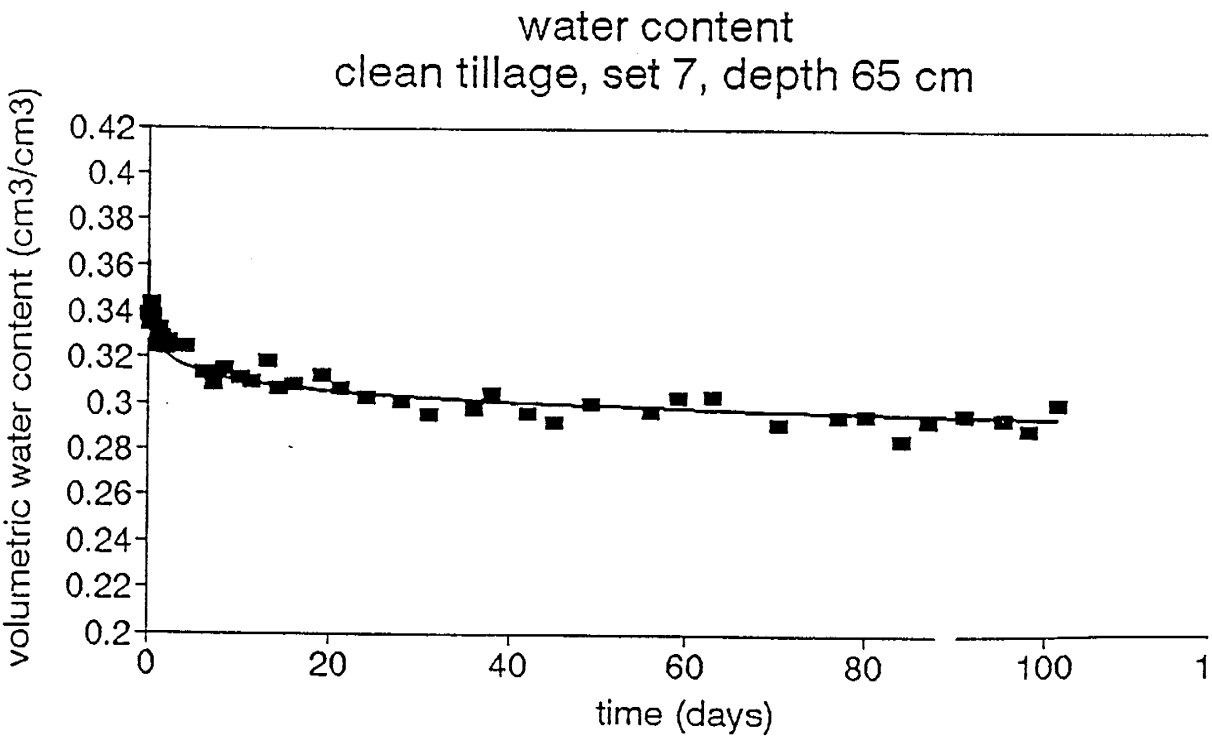

water content
clean tillage, set 6, depth 100 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0
20
40
60
80
100
120
time (days)
measured

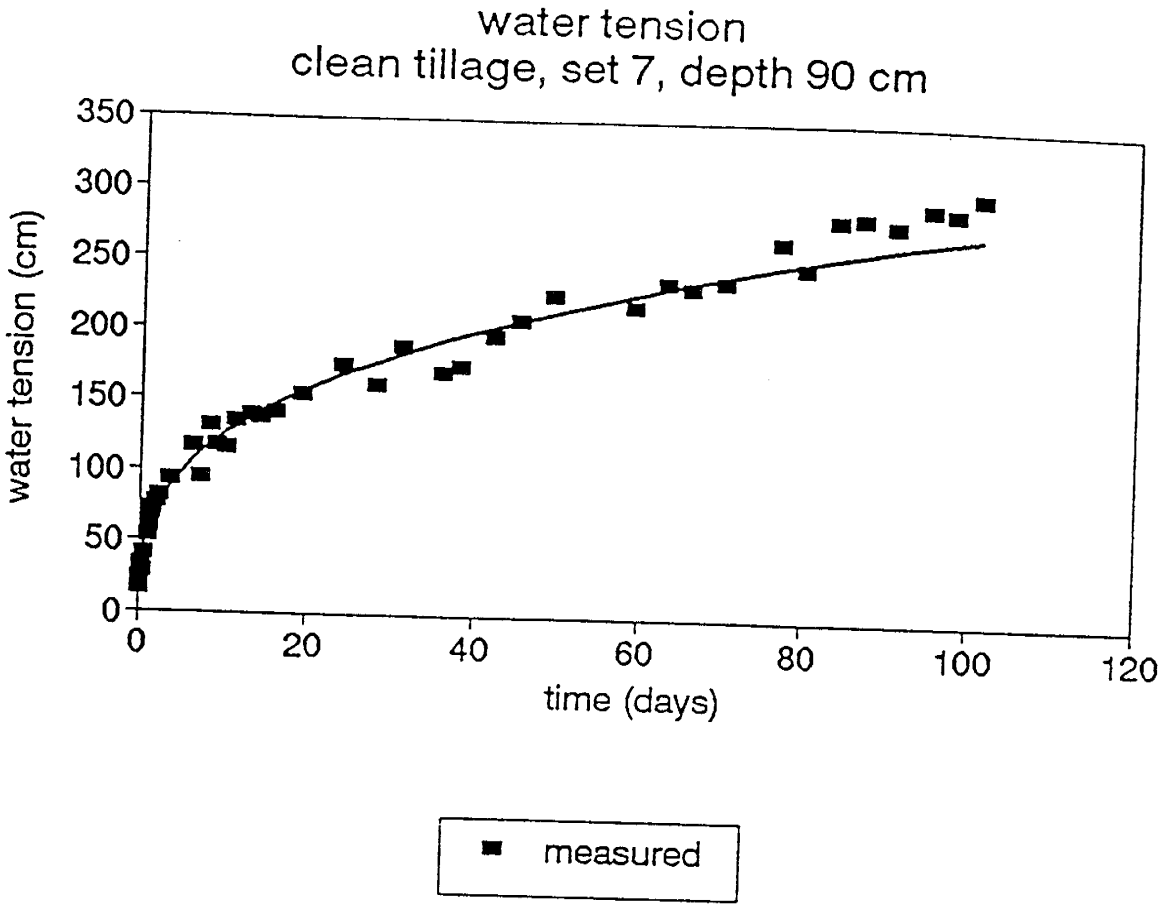

water tension
clean tillage, set 7, depth 40 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)

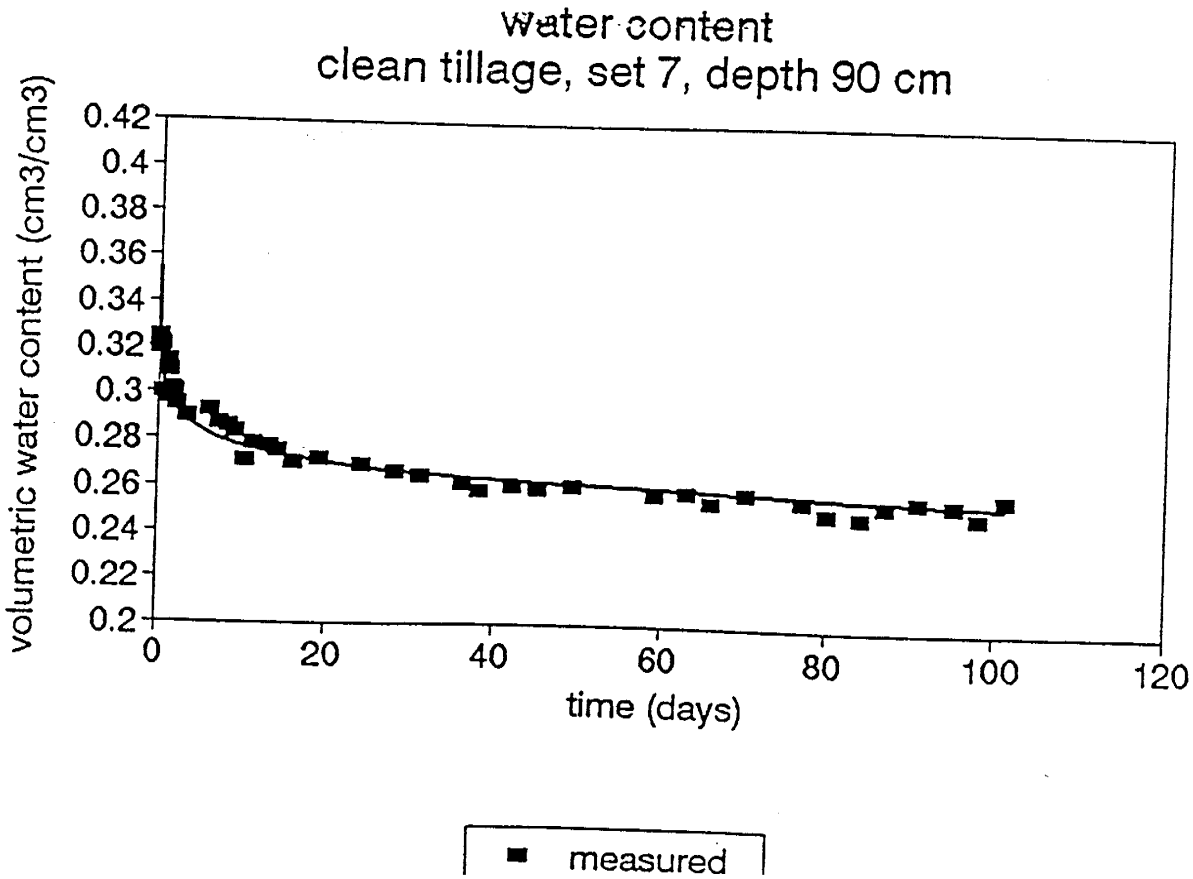

measured

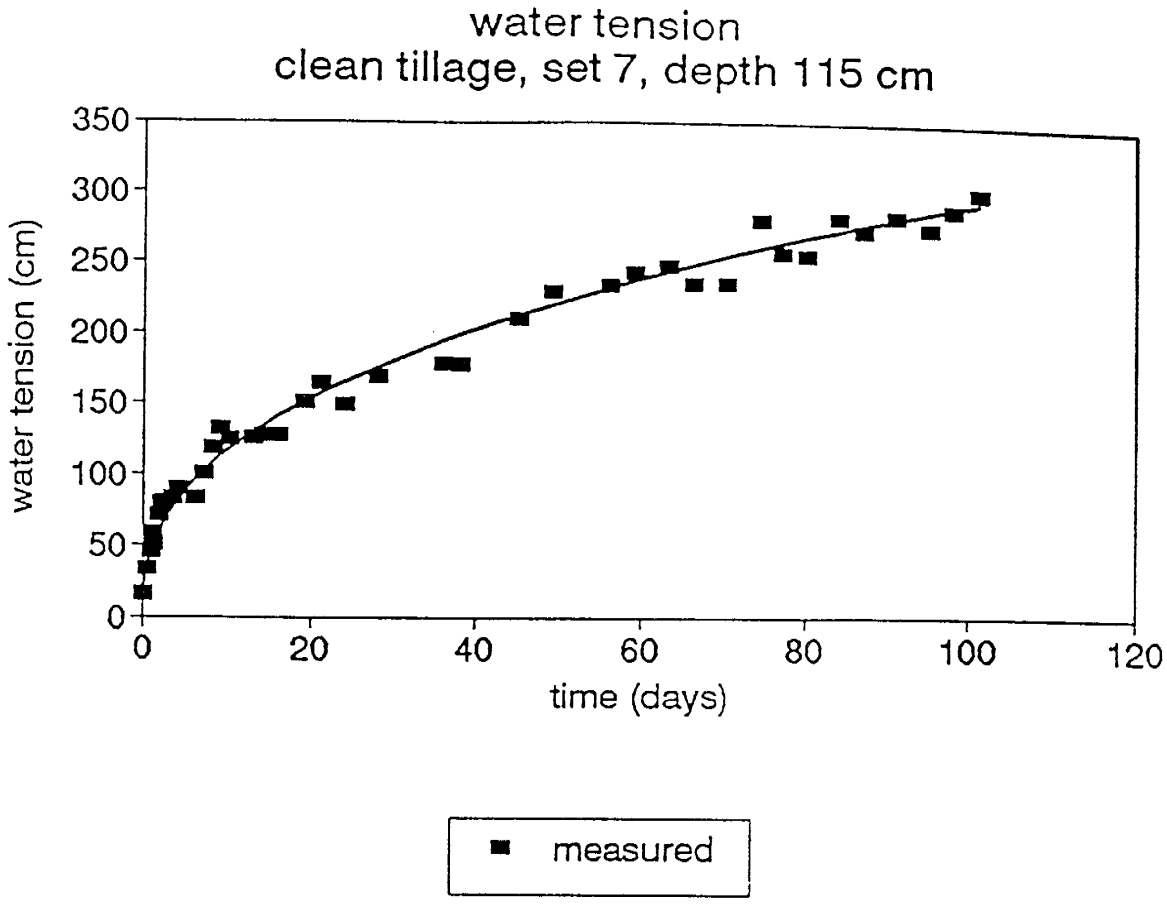

water content
clean tillage, set 7, depth 40 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)

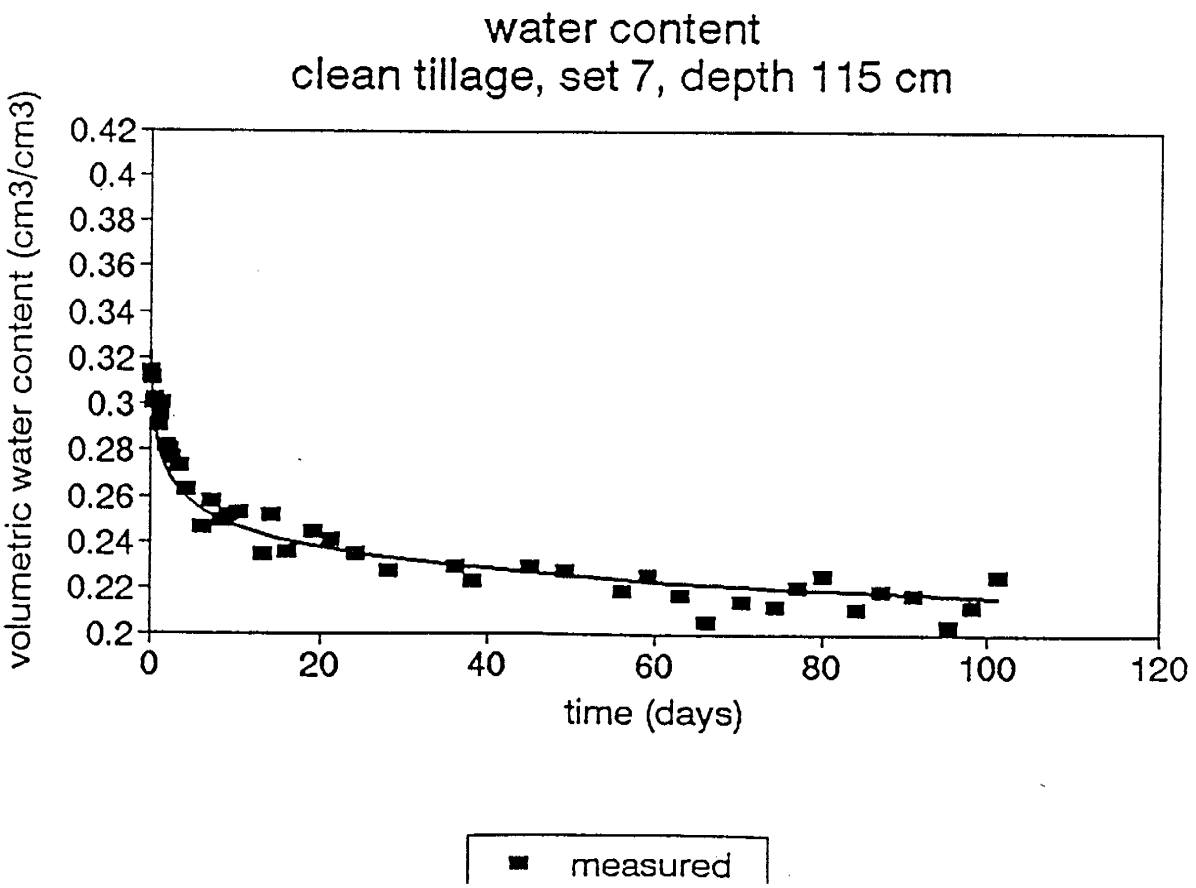

water tension
clean tillage, set 7, depth 65 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

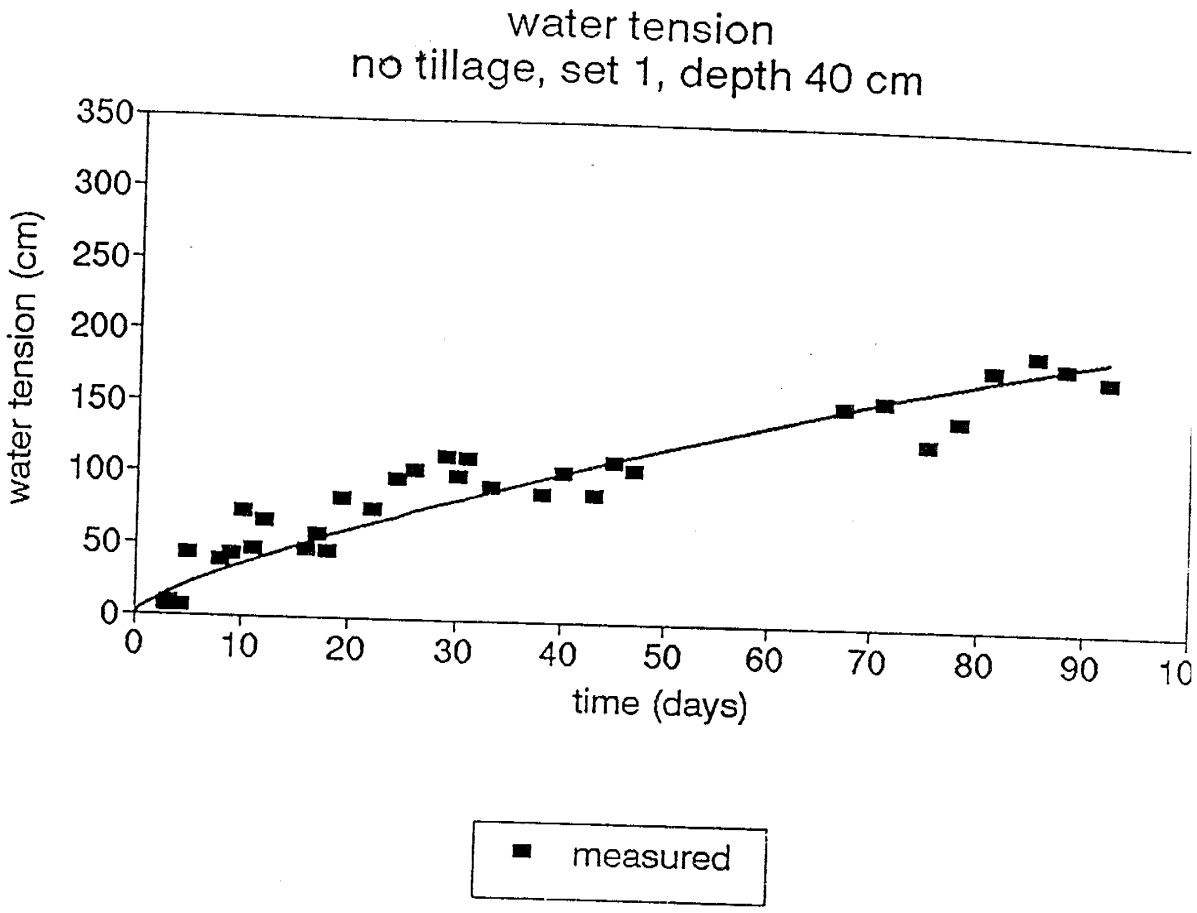

water content
clean tillage, set 7, depth 65 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
time (days)
measured

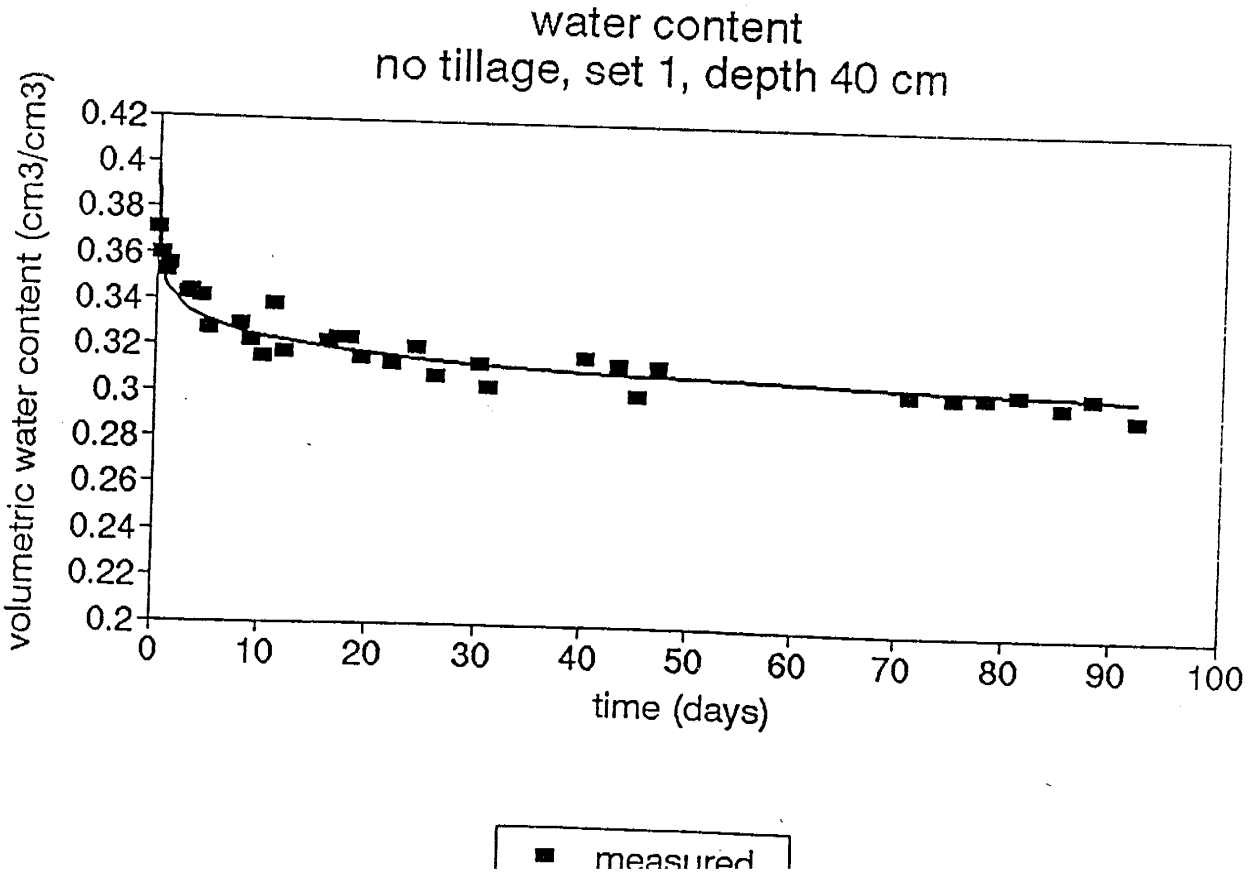

water tension
clean tillage, set 7, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

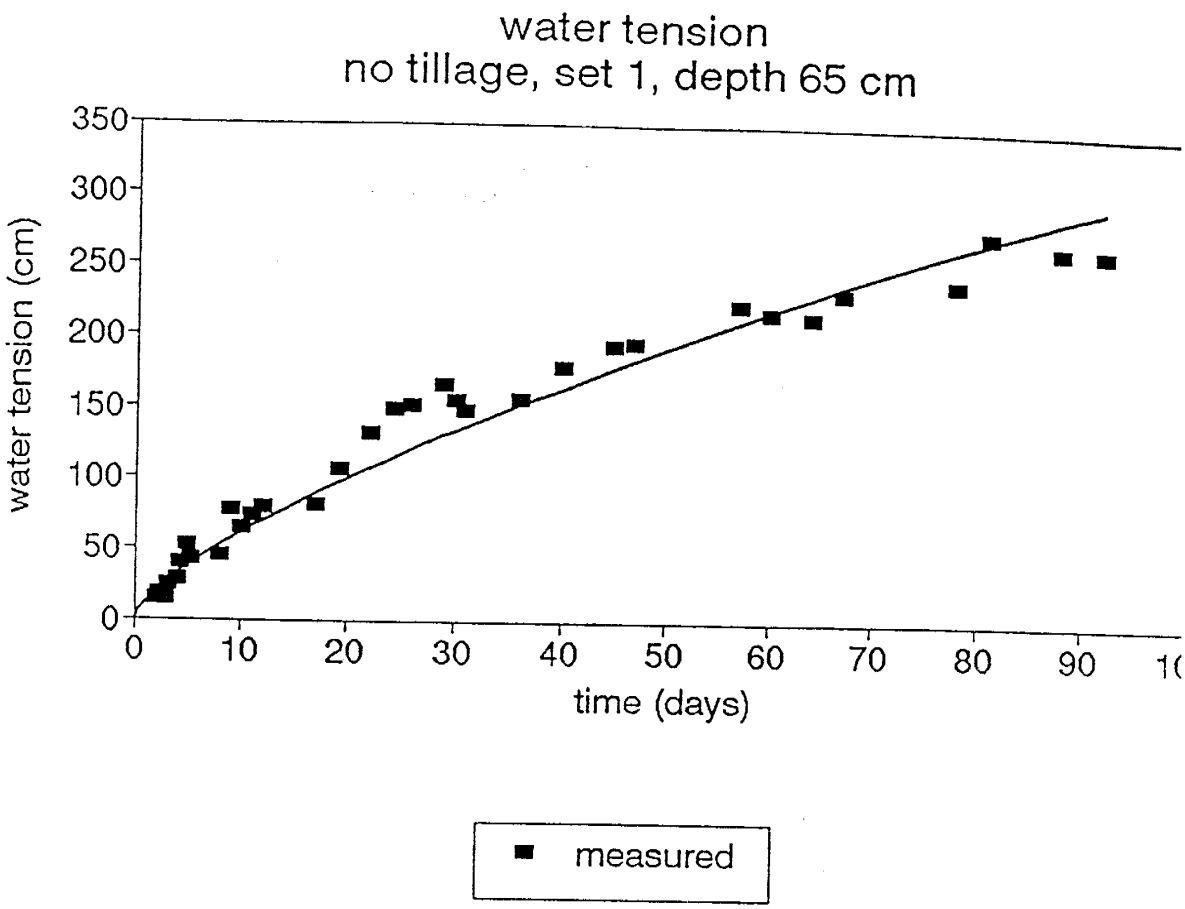

water content
clean tillage, set 7, depth 90 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

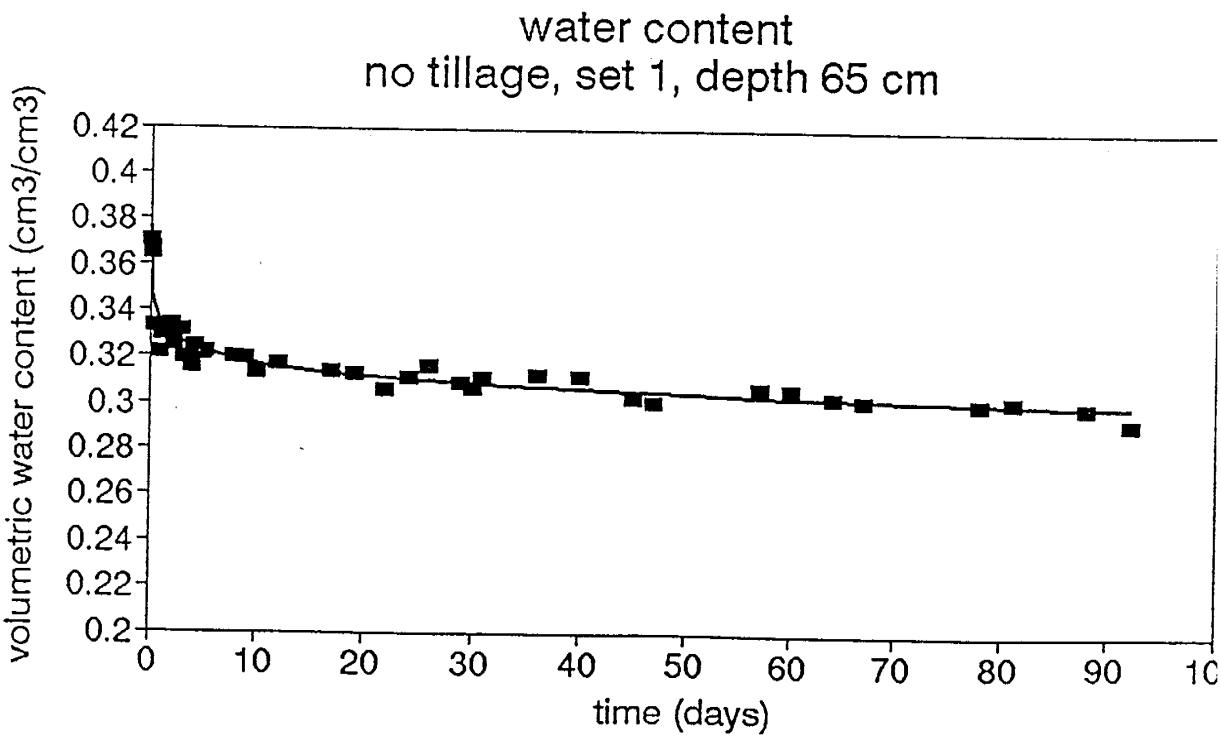

water tension
clean tillage, set 7, depth 115 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
20
40
60
80
100
120
time (days)
measured

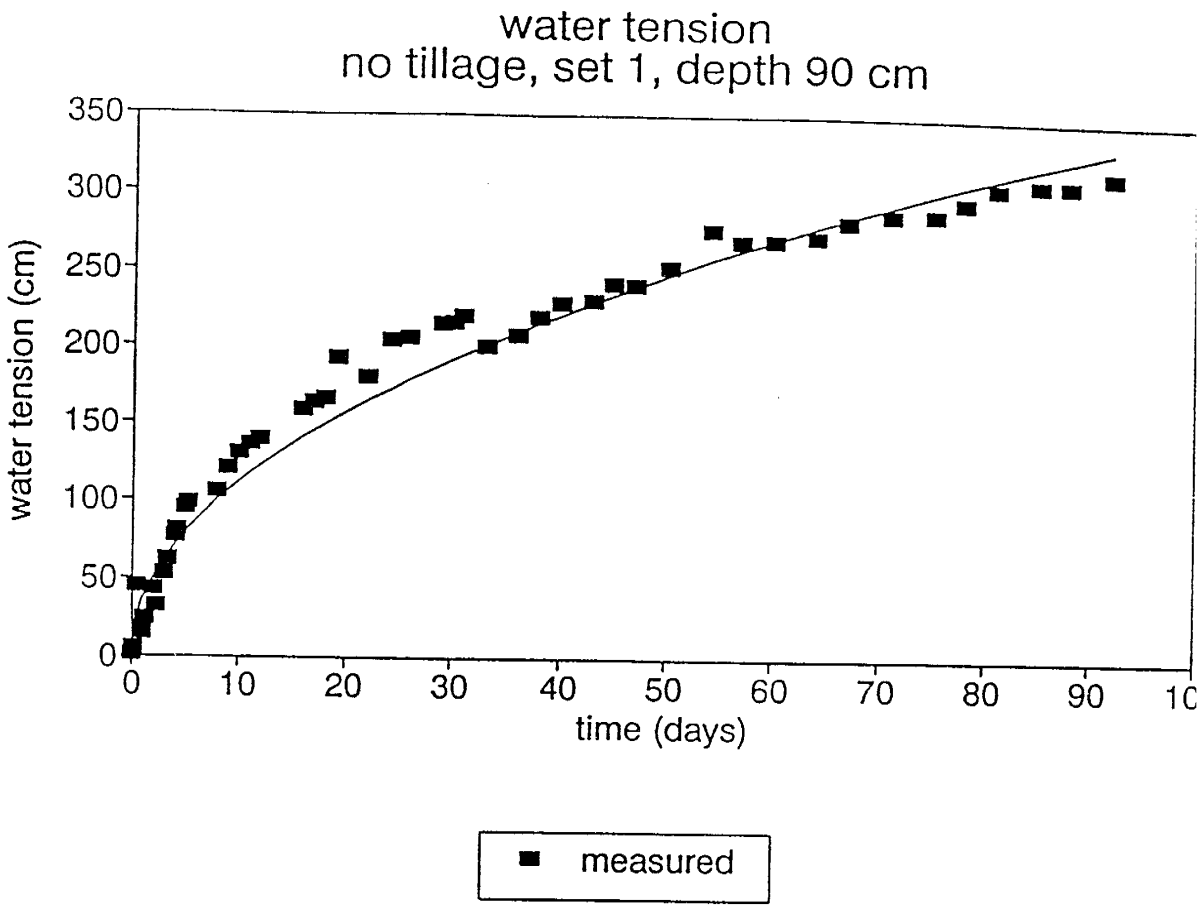

water content
clean tillage, set 7, depth 115 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
20
40
60
80
100
120
time (days)
measured

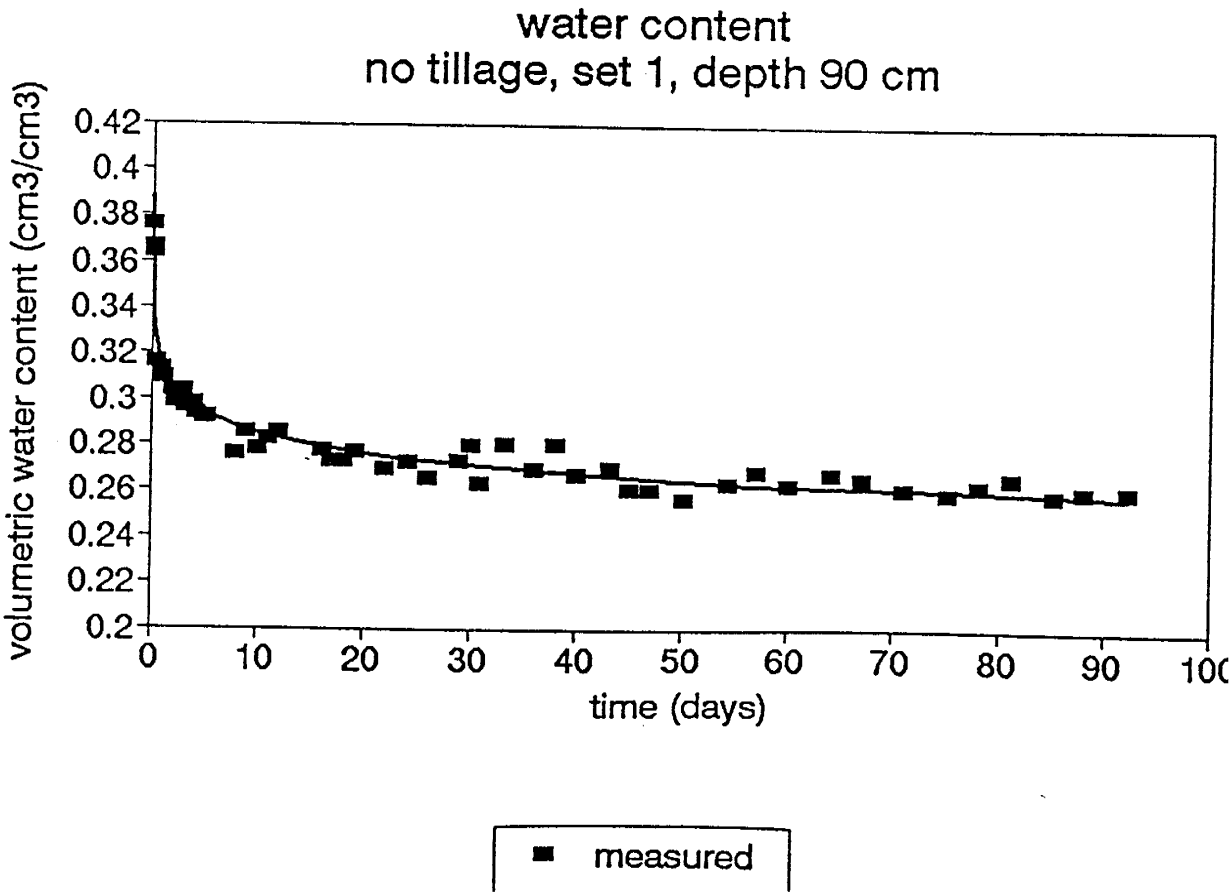

water tension
no tillage, set 1, depth 40 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

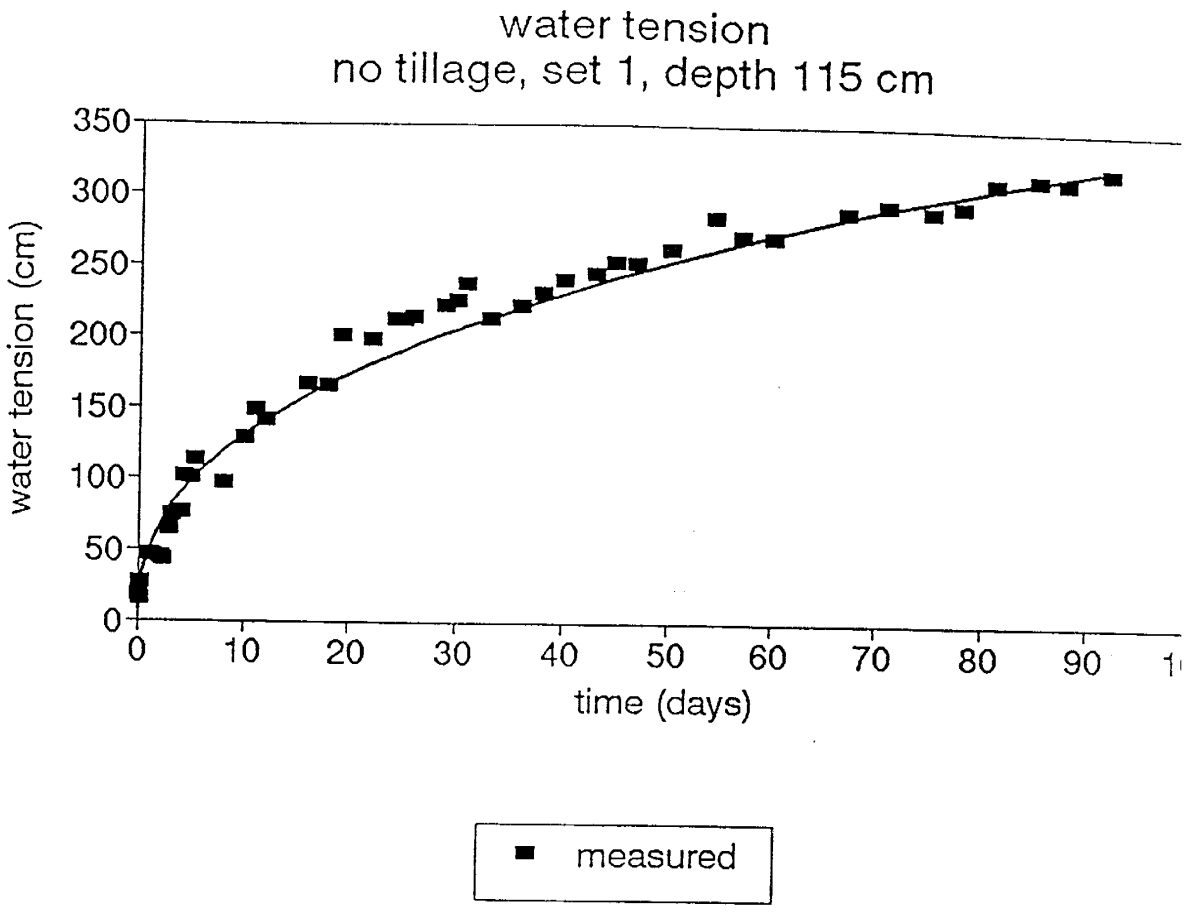

water content
no tillage, set 1, depth 40 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

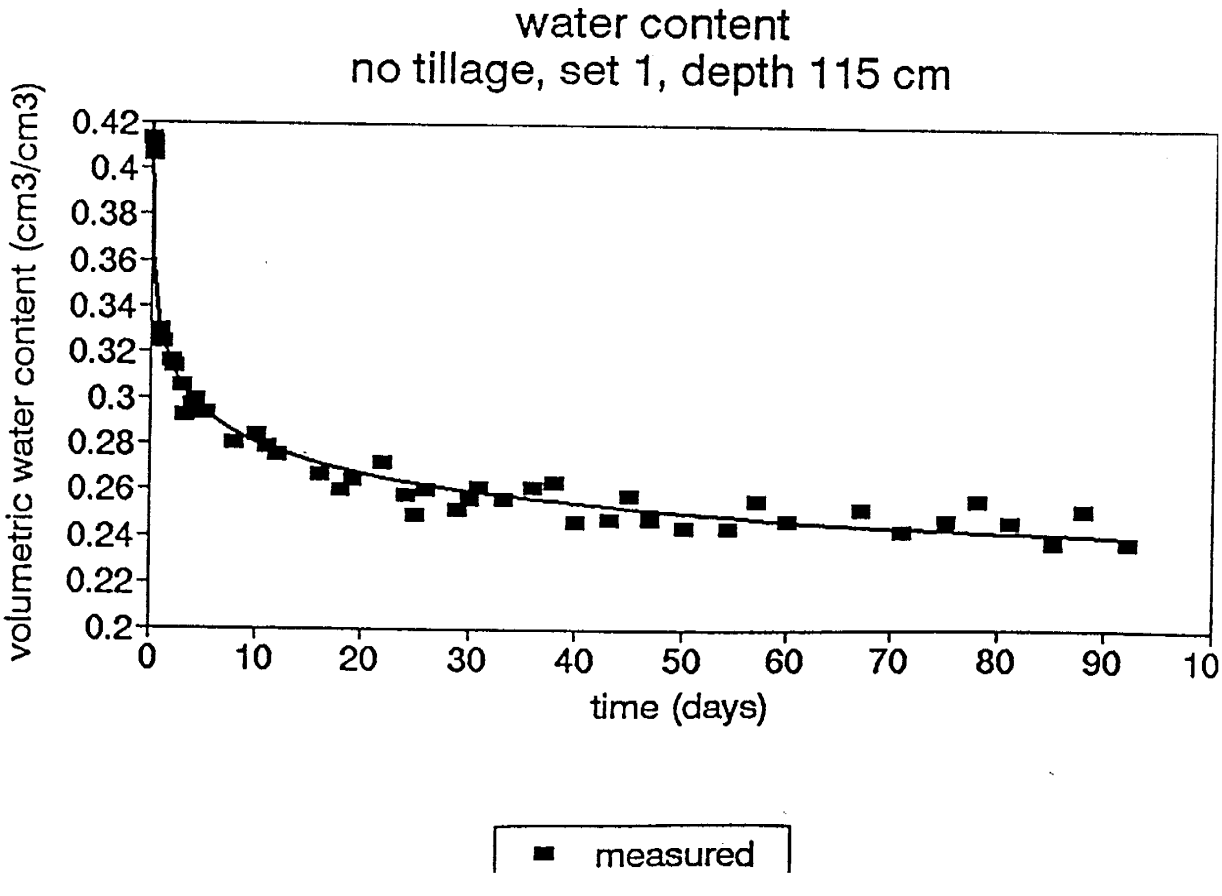

water tension
no tillage, set 1, depth 65 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

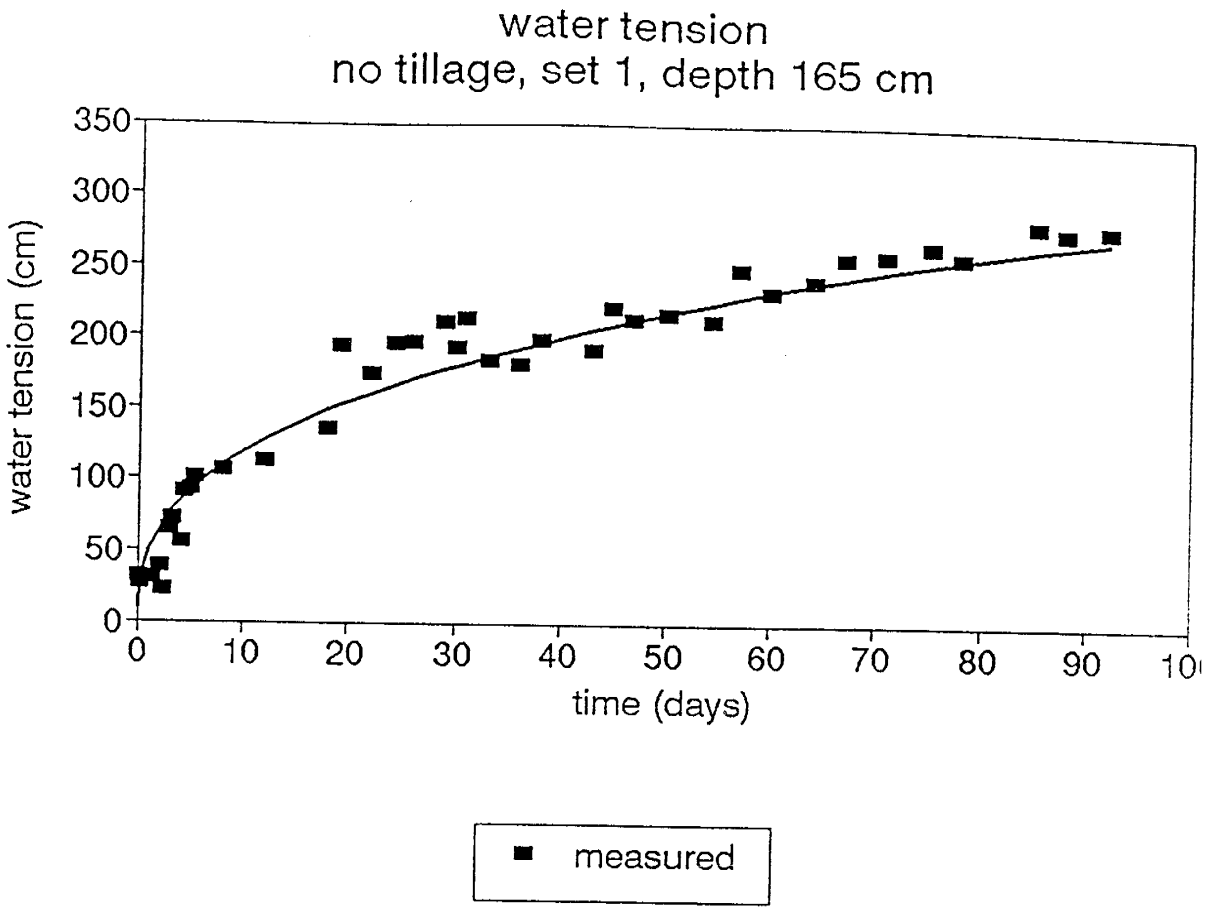

water content
no tillage, set 1, depth 65 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

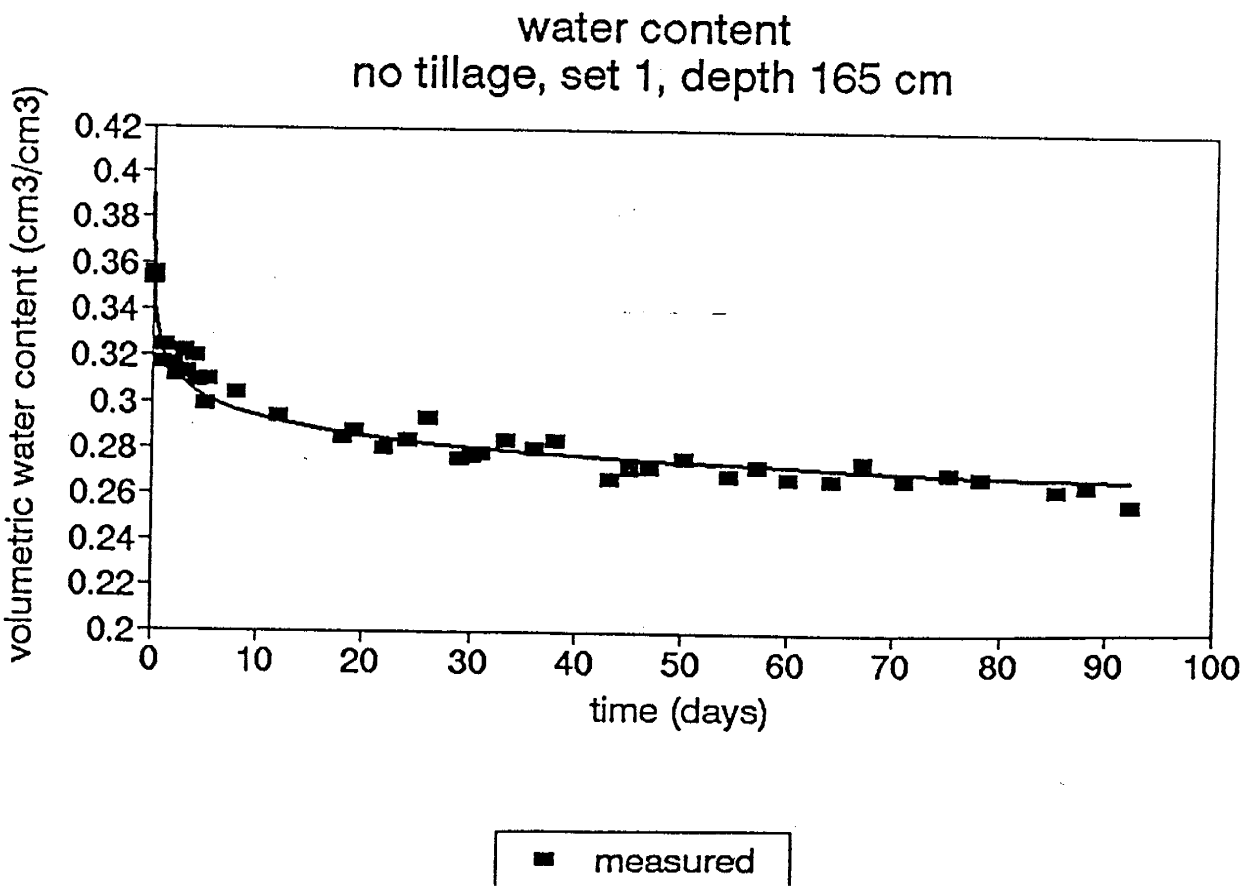

water tension
no tillage, set 1, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

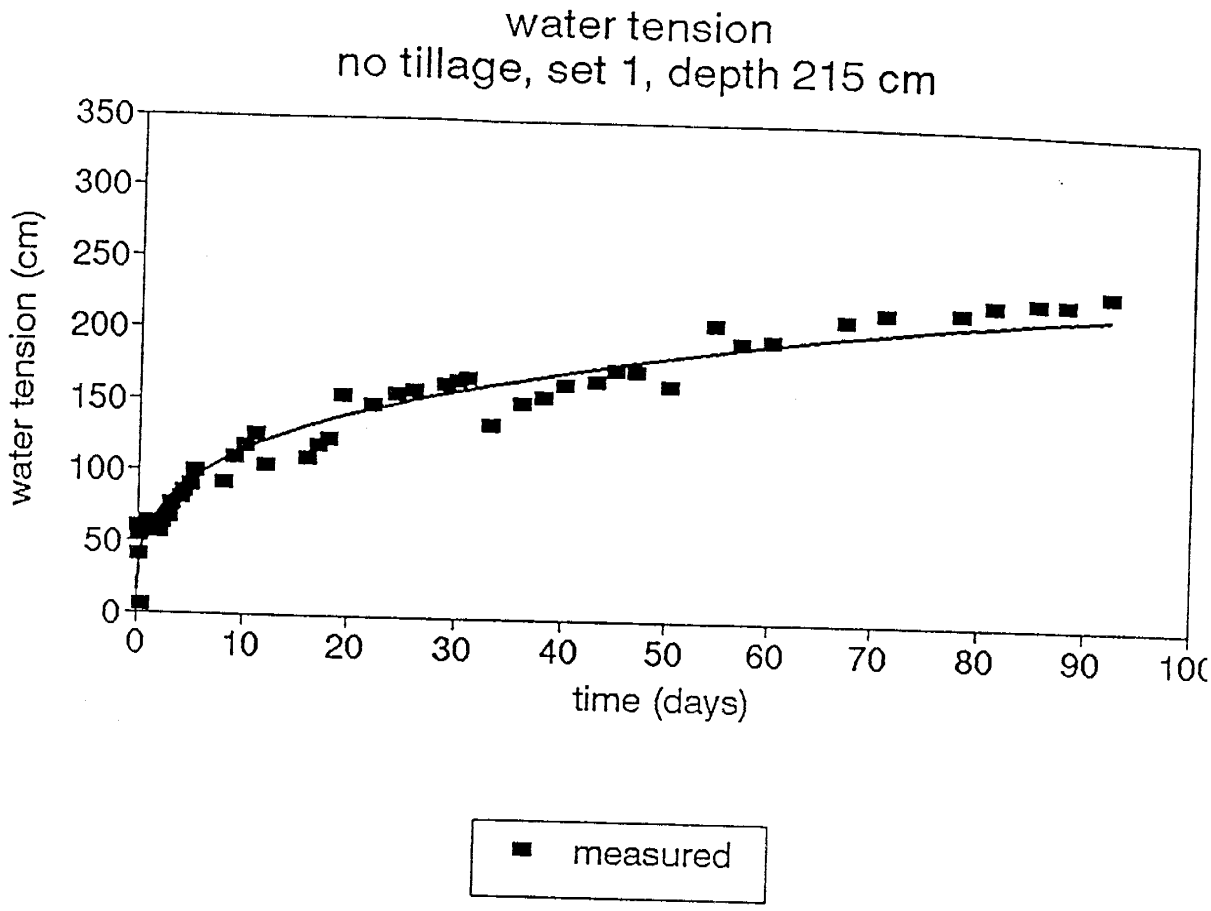

water content
no tillage, set 1, depth 90 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

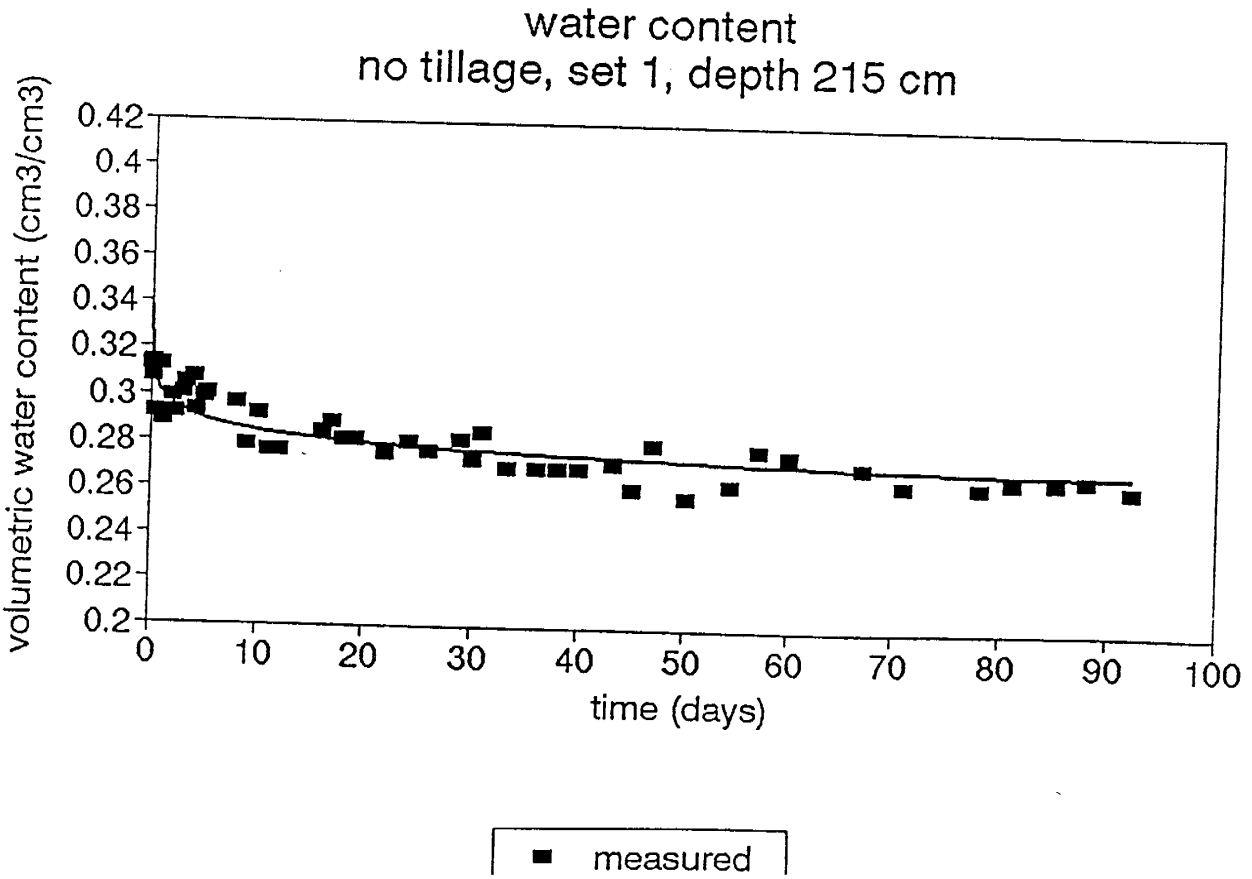

water tension
no tillage, set 1, depth 115 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

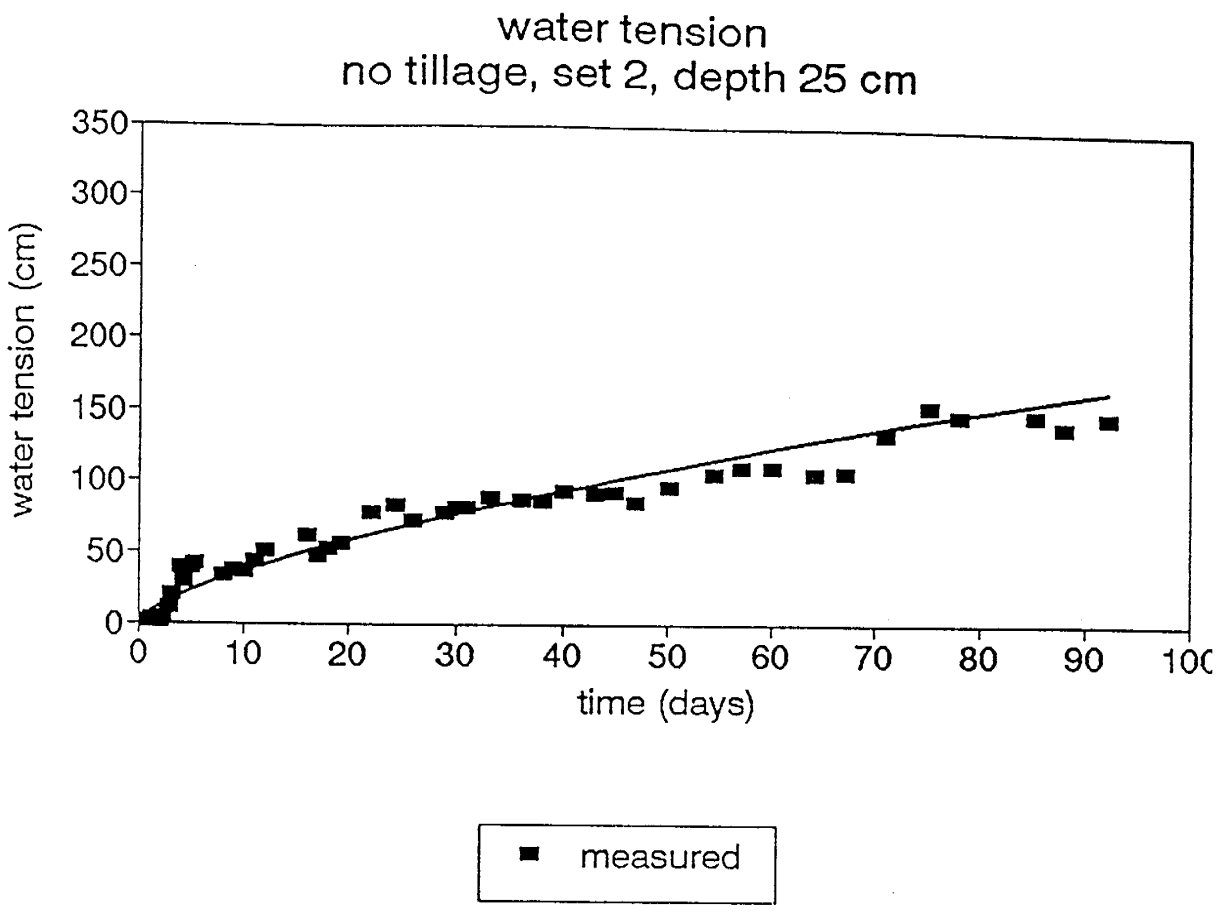

water content
no tillage, set 1, depth 115 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

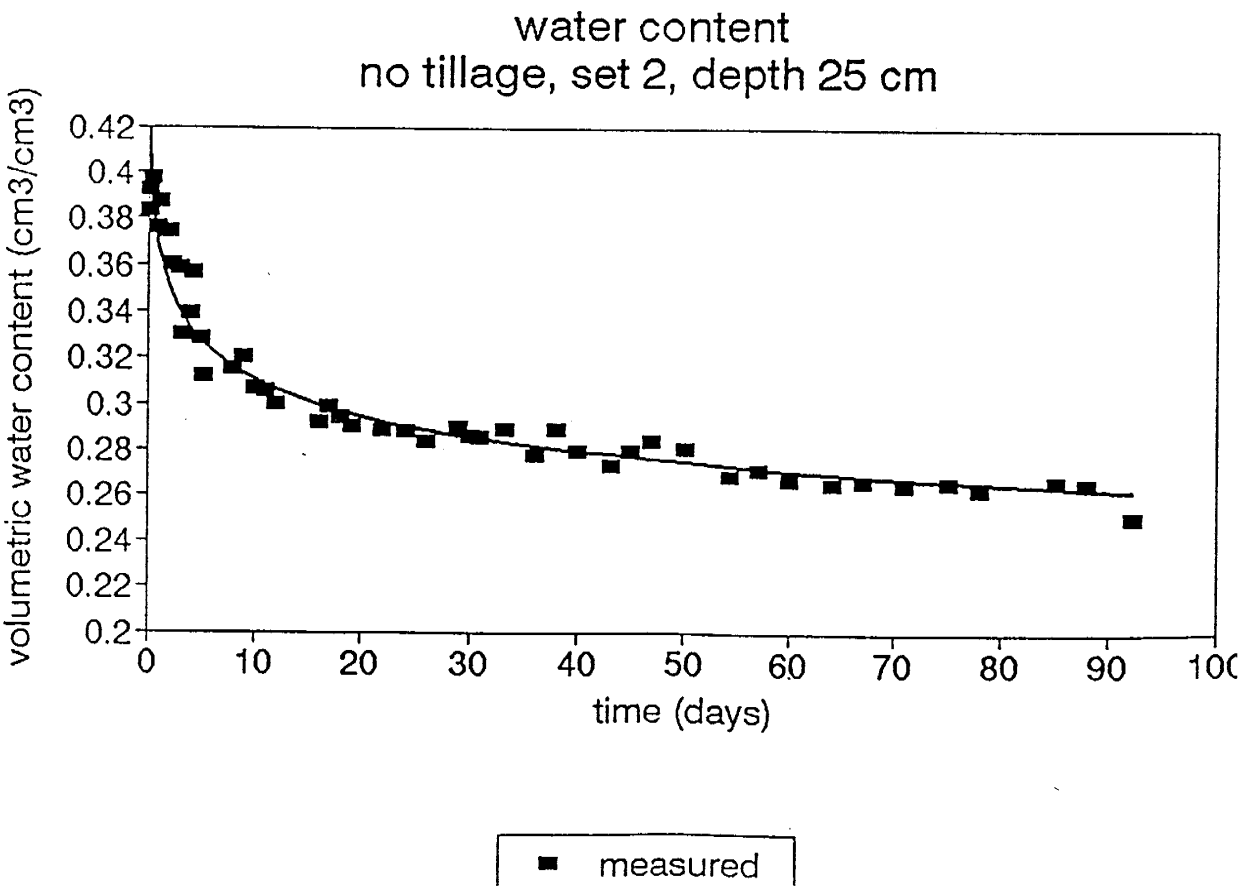

water tension
no tillage, set 1, depth 165 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

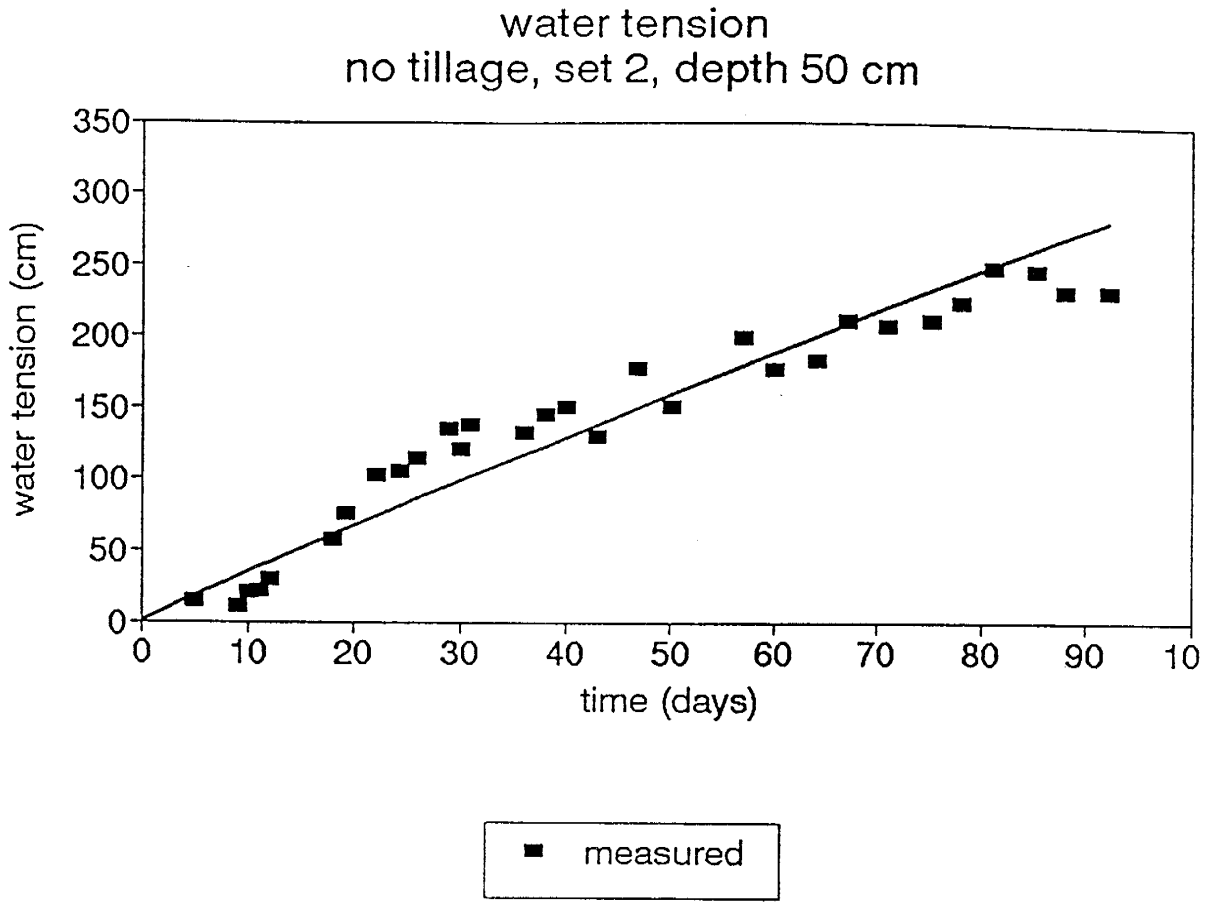

water content
no tillage, set 1, depth 165 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

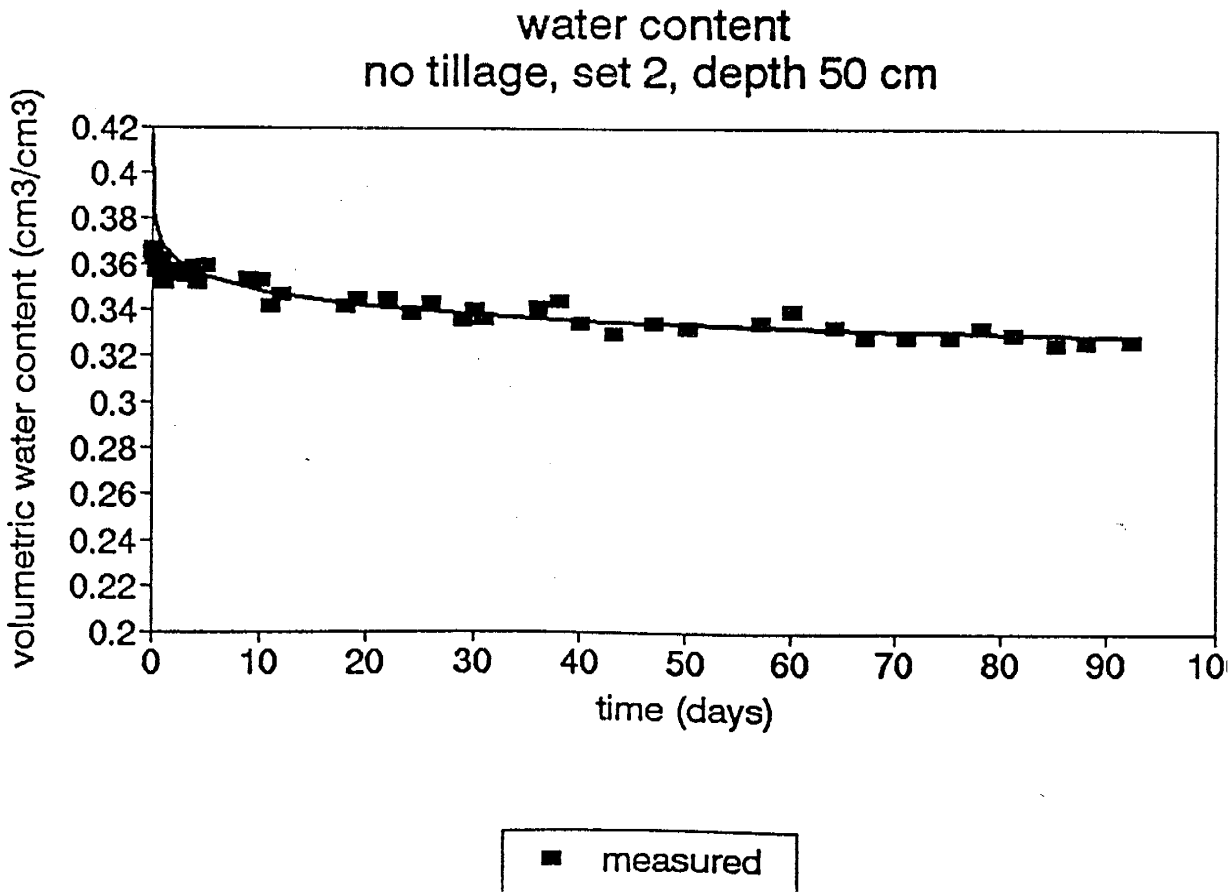

water tension
no tillage, set 1, depth 215 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

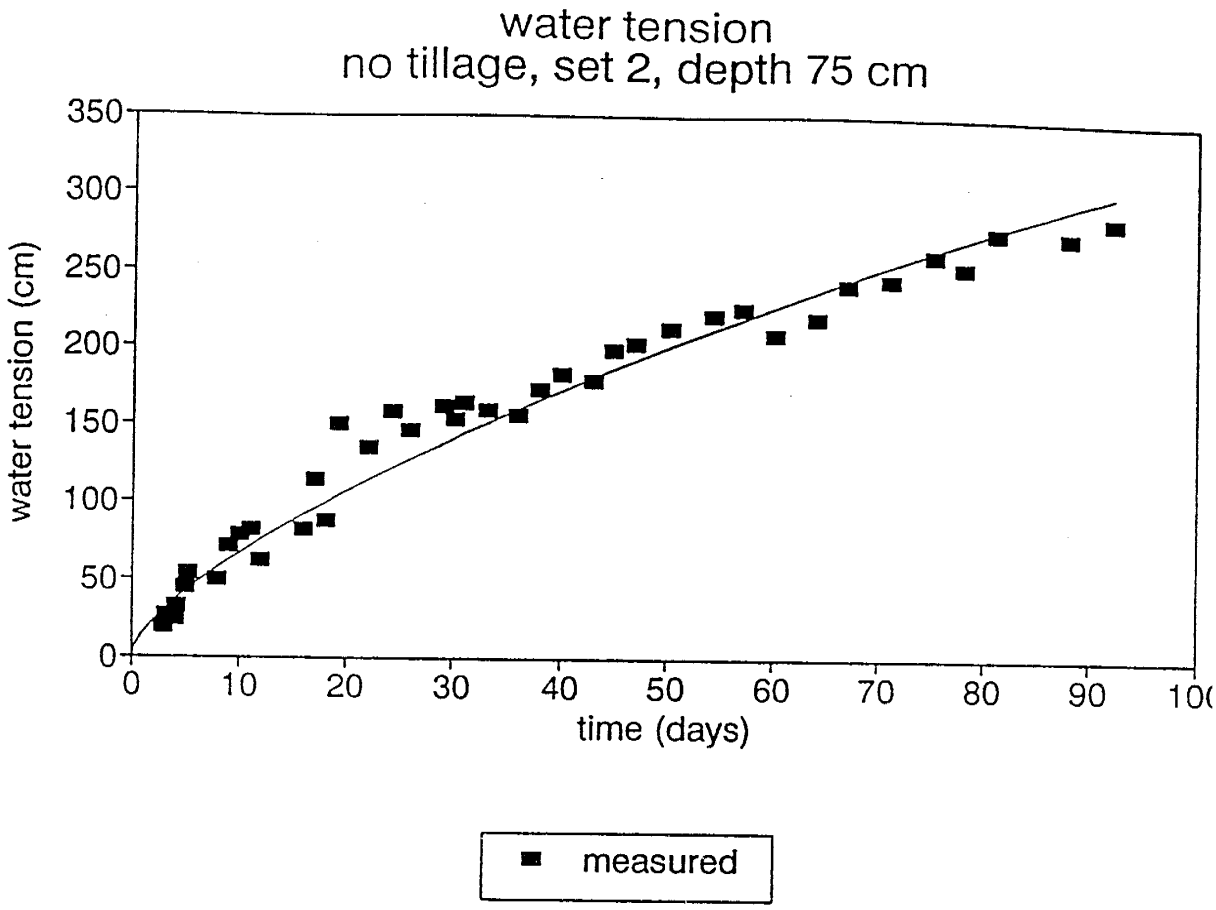

water content
no tillage, set 1, depth 215 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

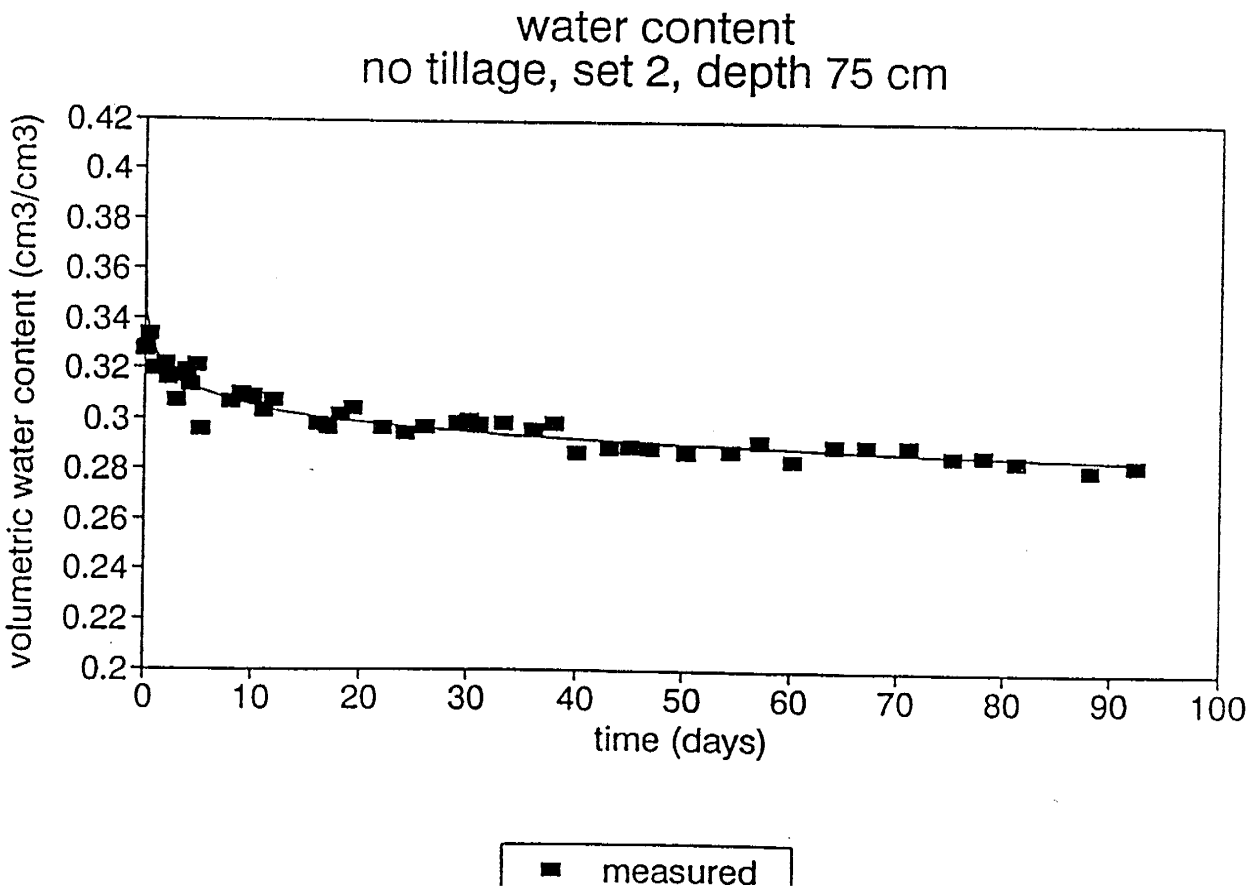

water tension
no tillage, set 2, depth 25 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

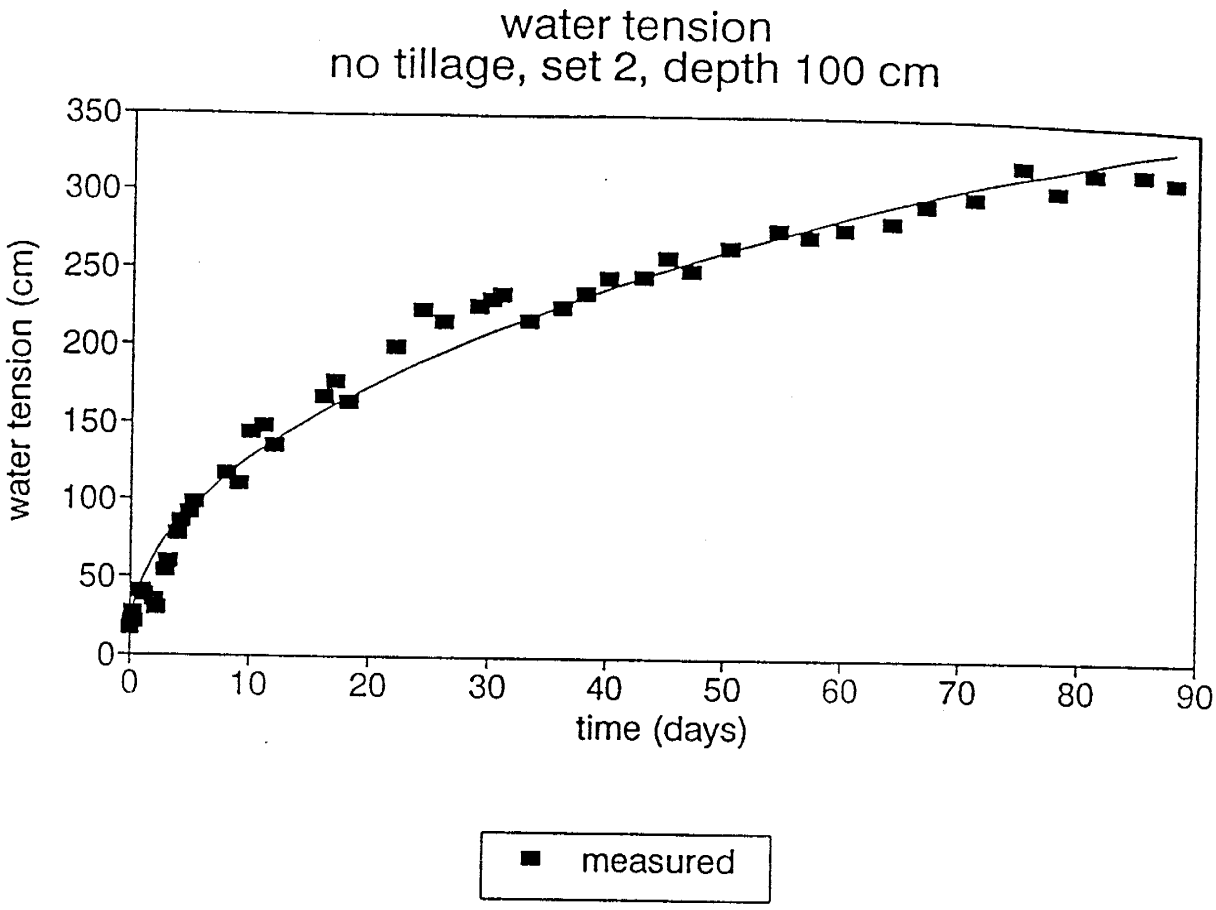

water content
no tillage, set 2, depth 25 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

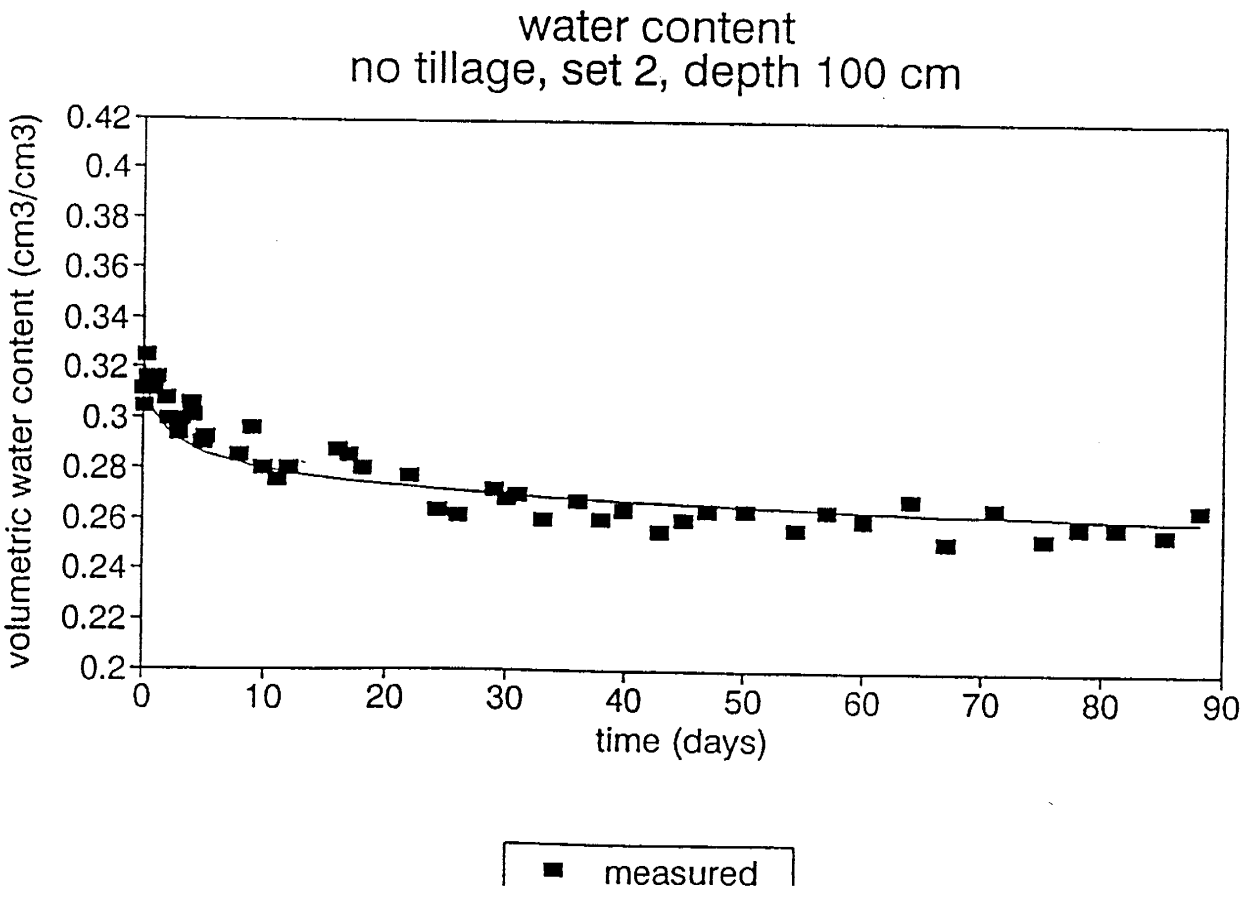

water tension
no tillage, set 2, depth 50 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

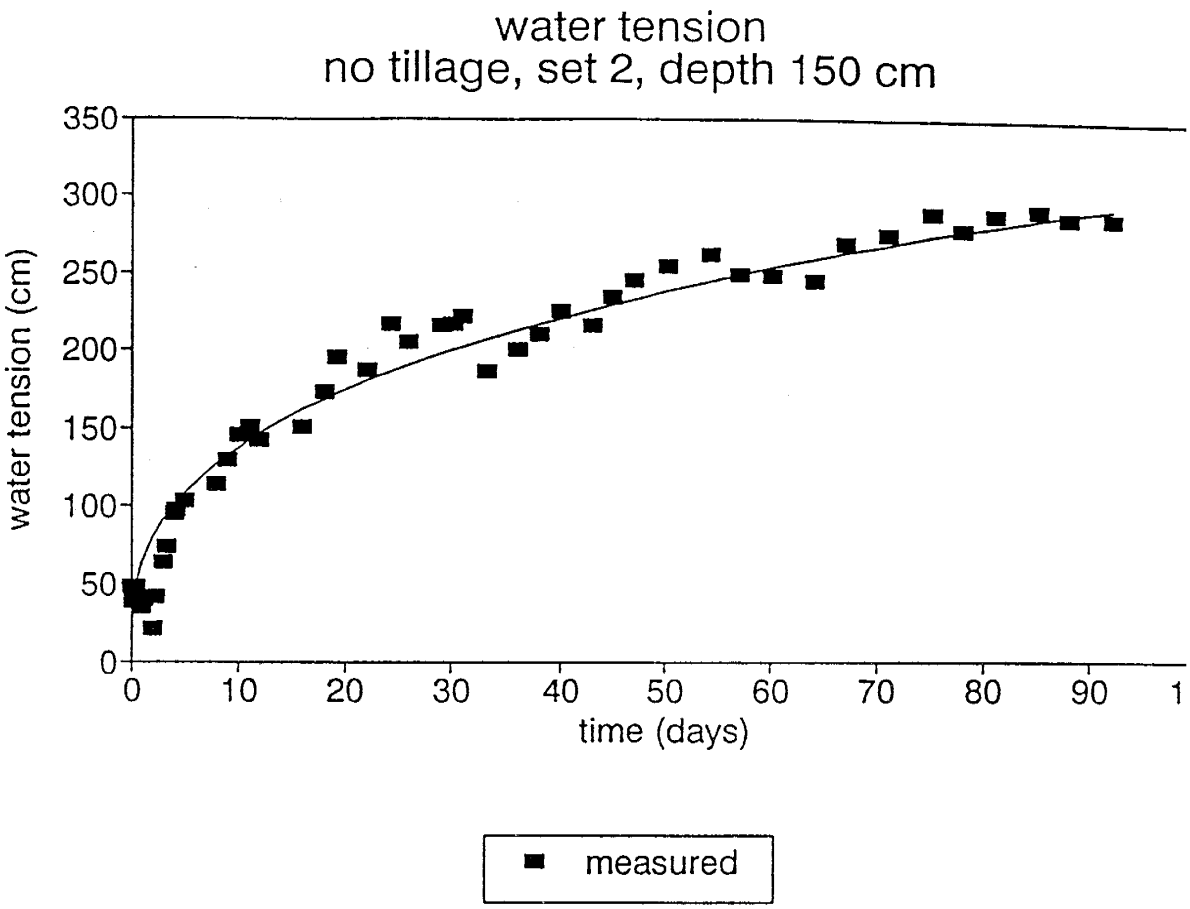

water content
no tillage, set 2, depth 50 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

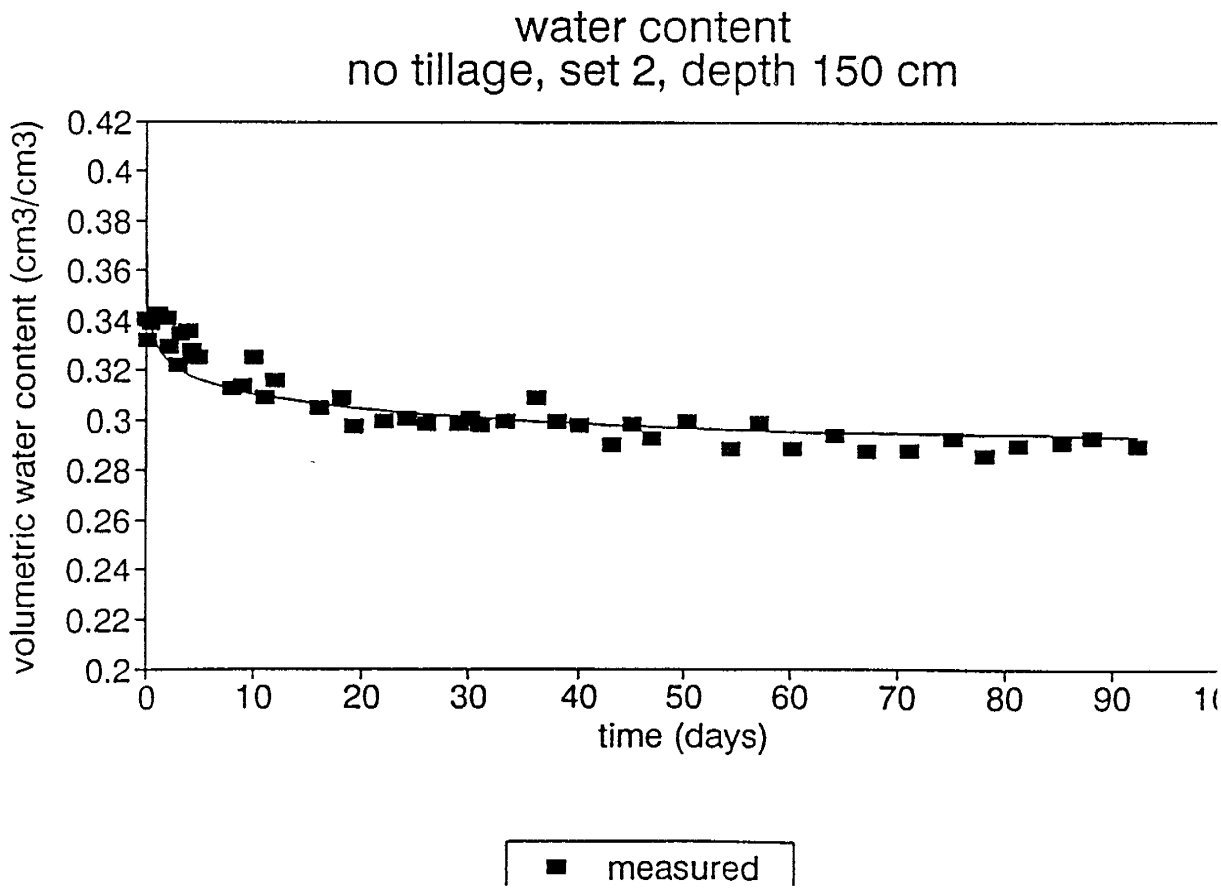

water tension
no tillage, set 2, depth 75 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

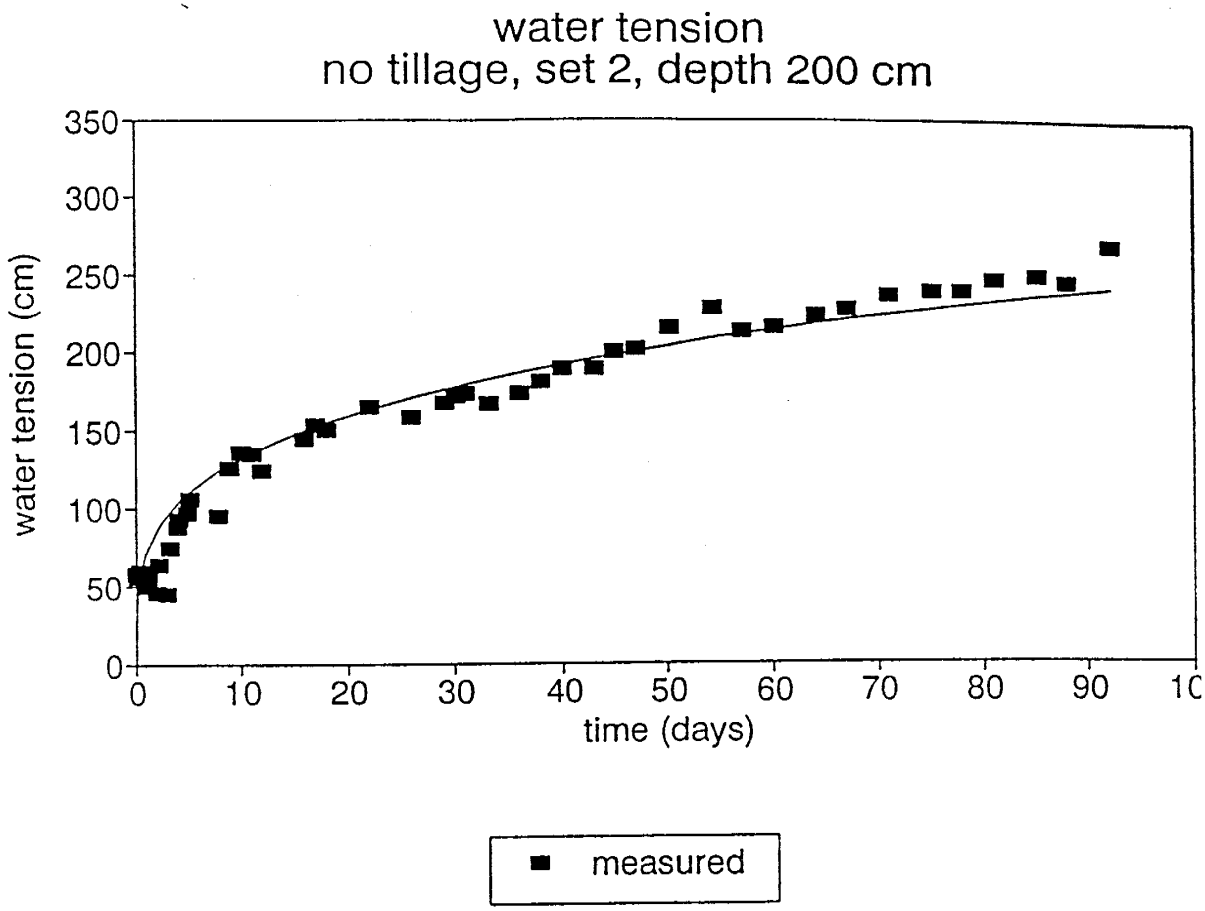

water content
no tillage, set 2, depth 75 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

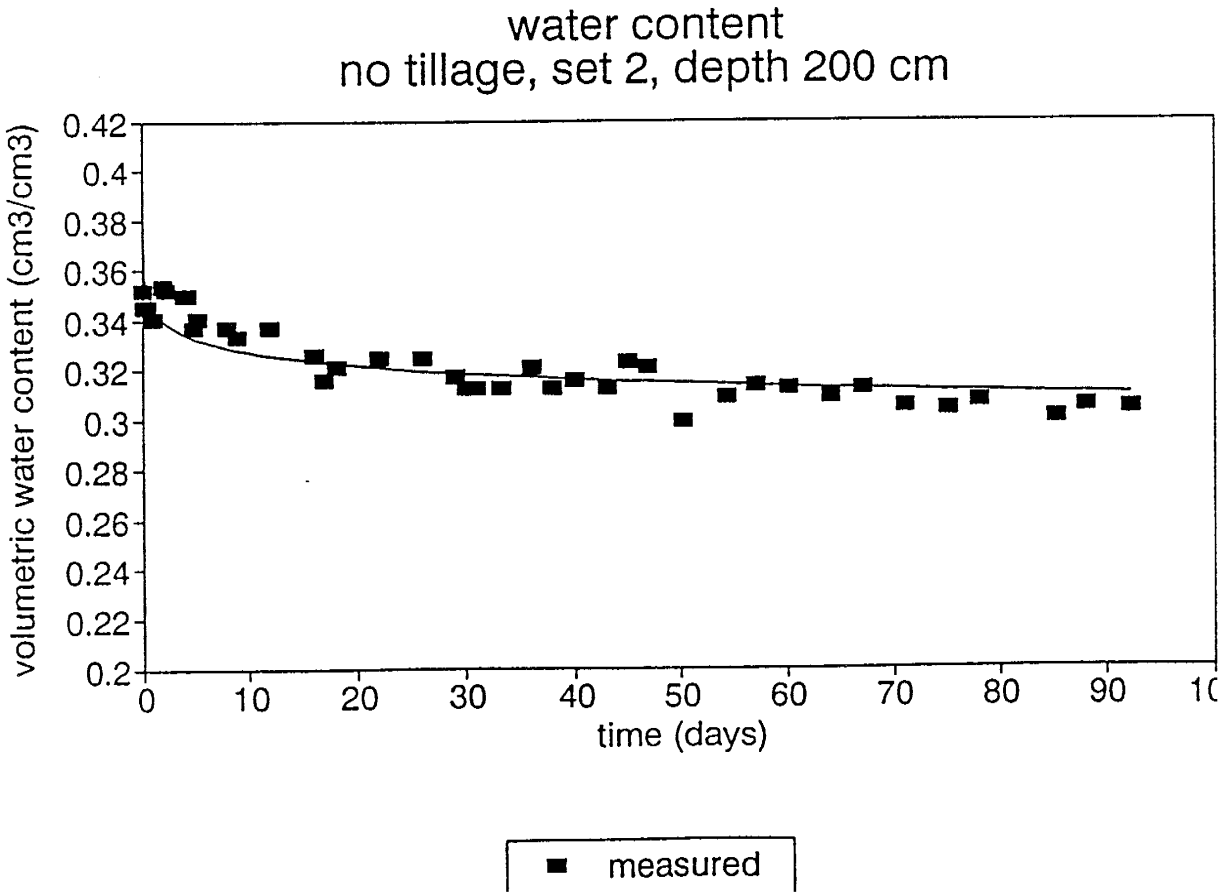

water tension
no tillage, set 2, depth 100 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

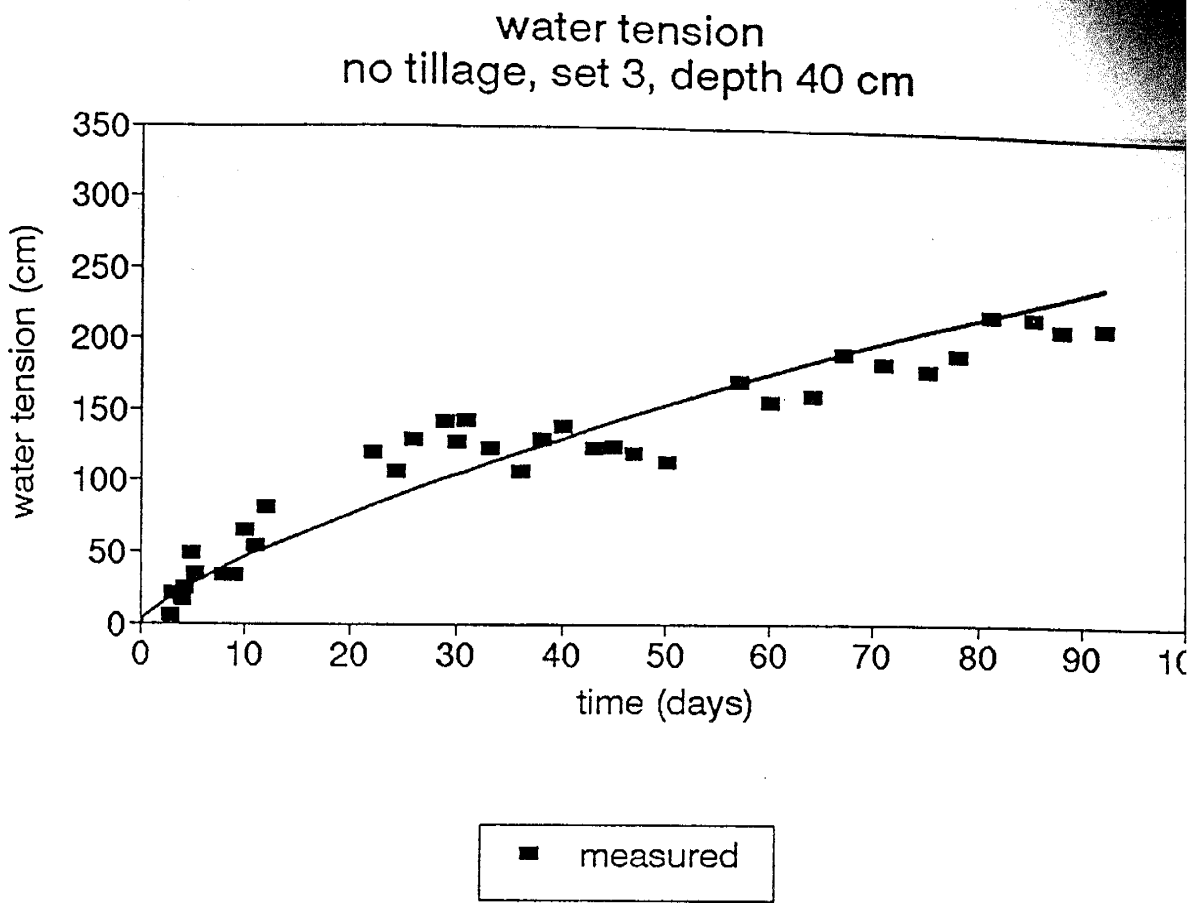

water content
no tillage, set 2, depth 100 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

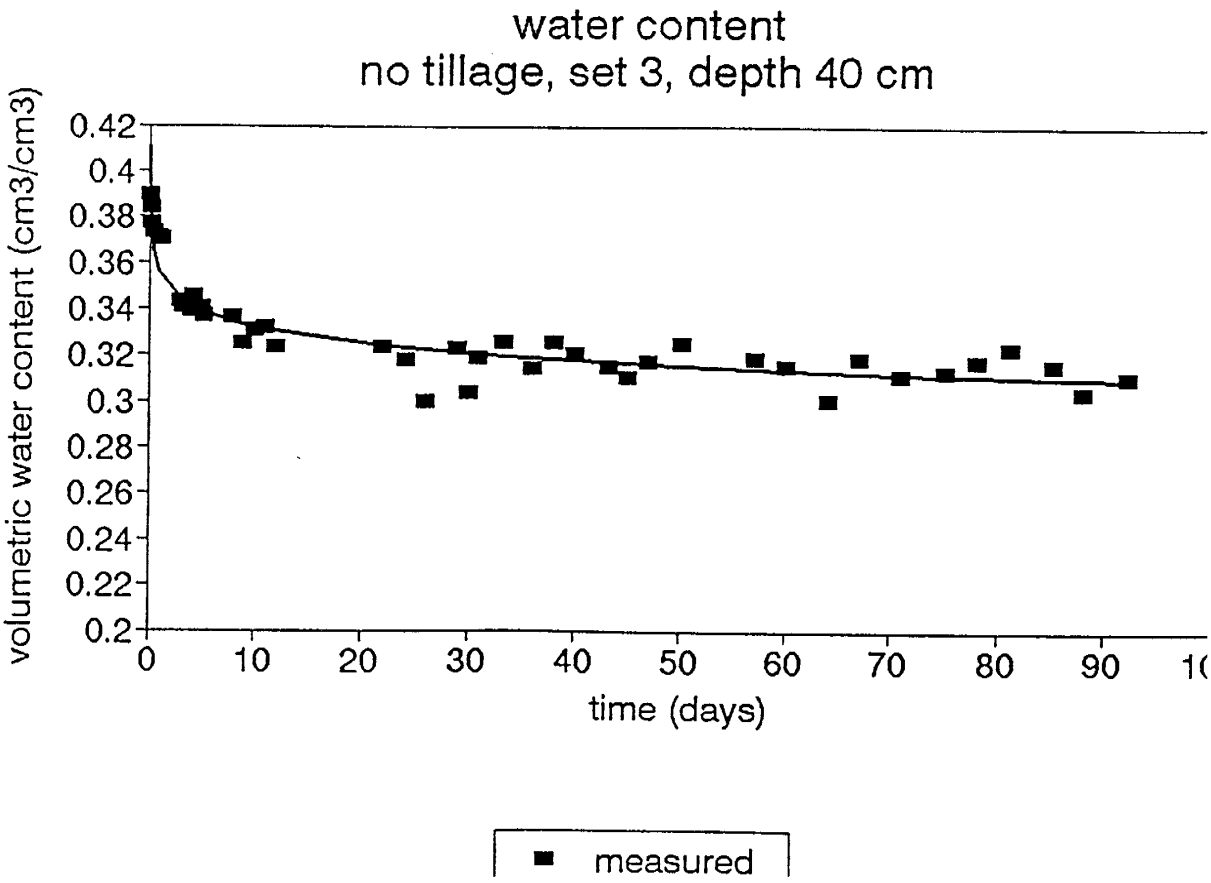

water tension
no tillage, set 2, depth 150 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

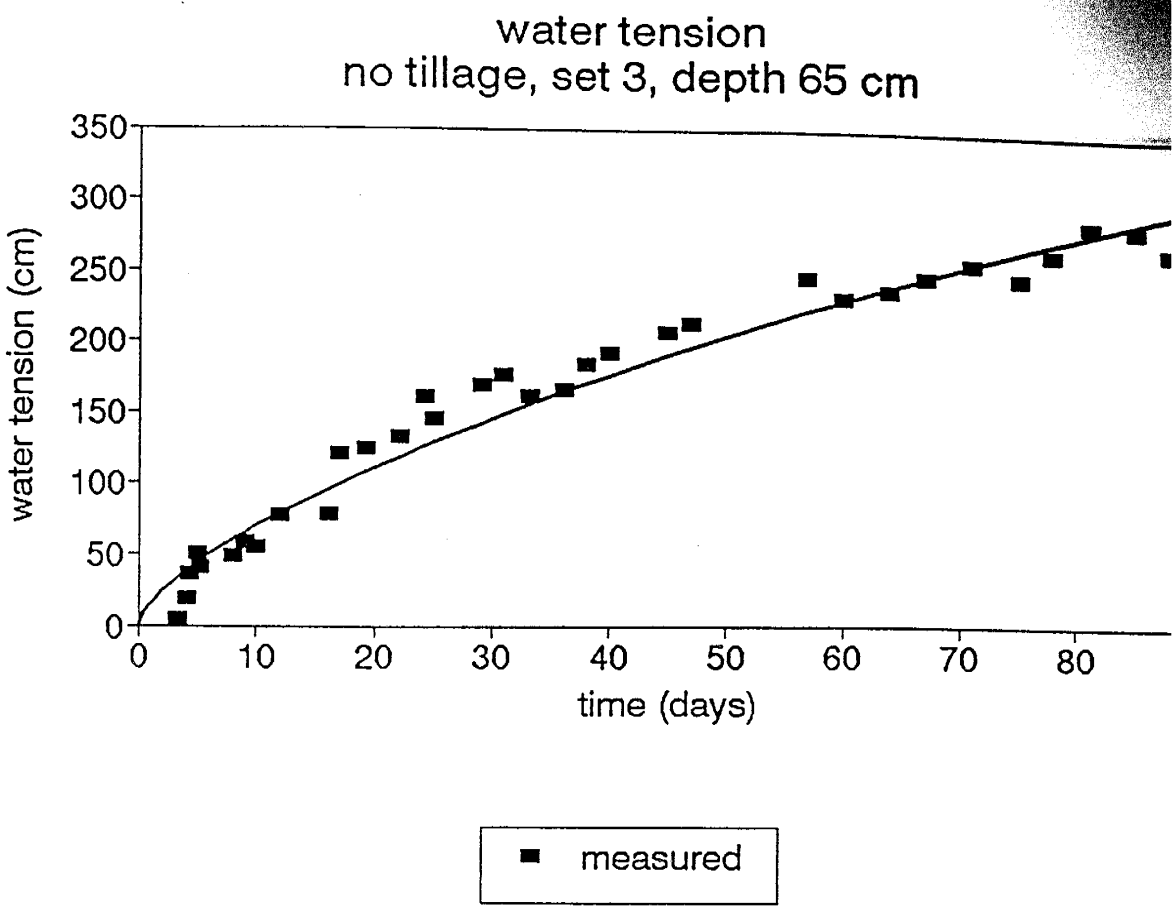

water content
no tillage, set 2, depth 150 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

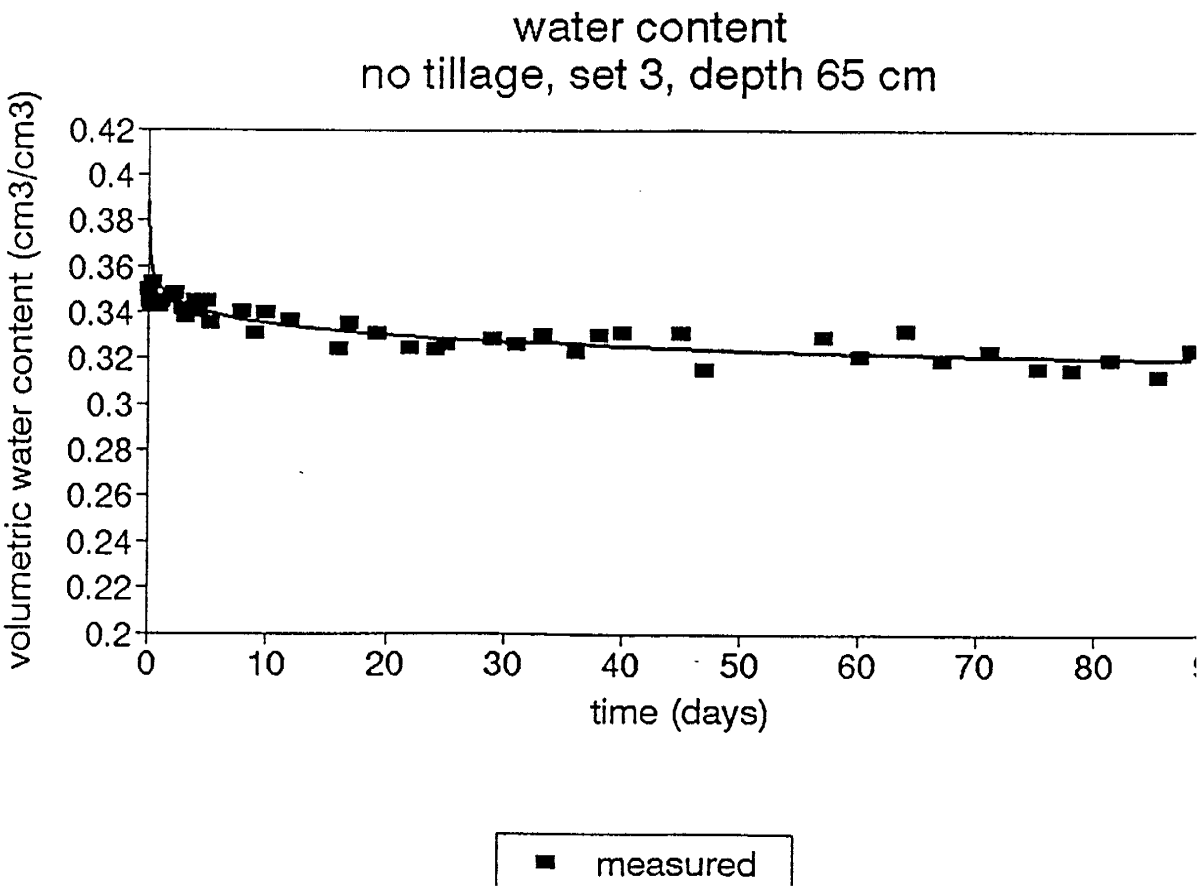

water tension
no tillage, set 2, depth 200 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

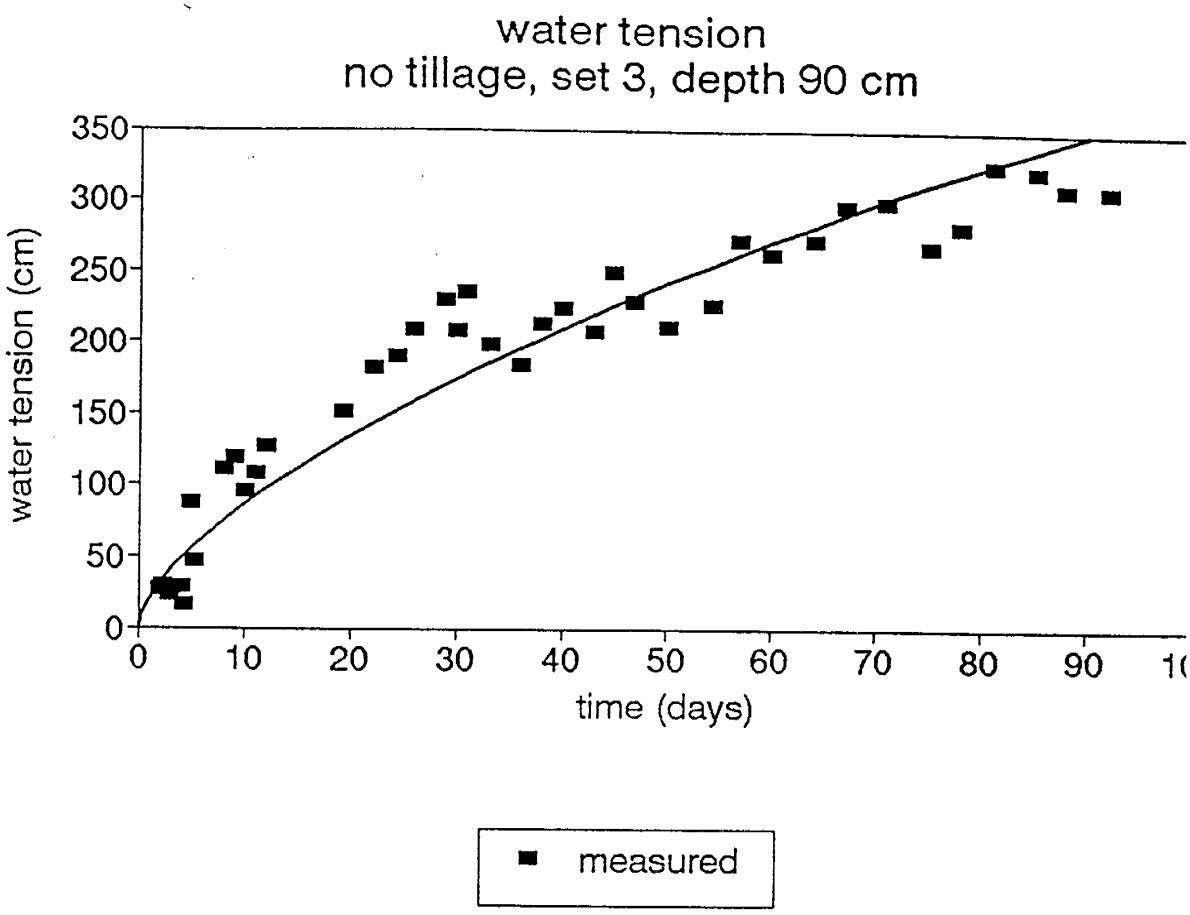

water content
no tillage, set 2, depth 200 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

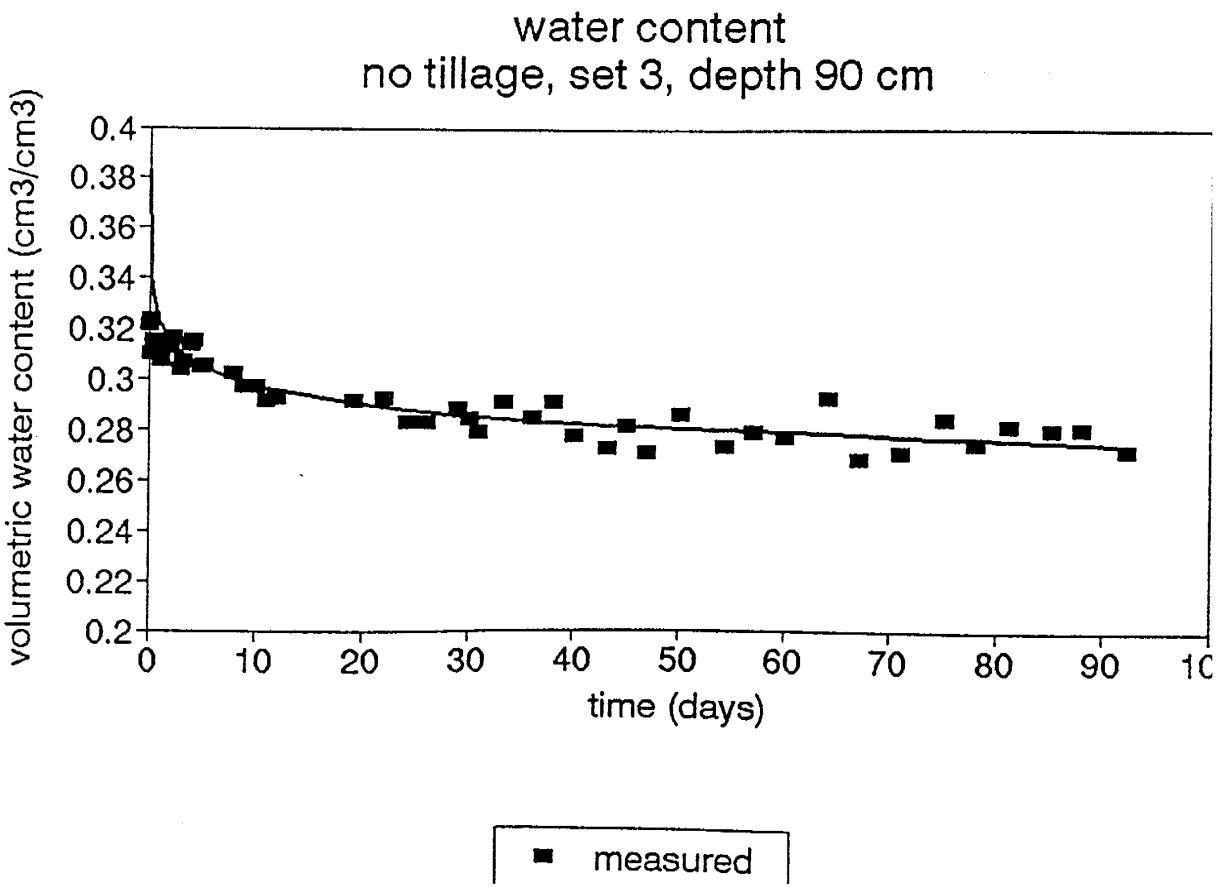

water tension
no tillage, set 3, depth 40 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

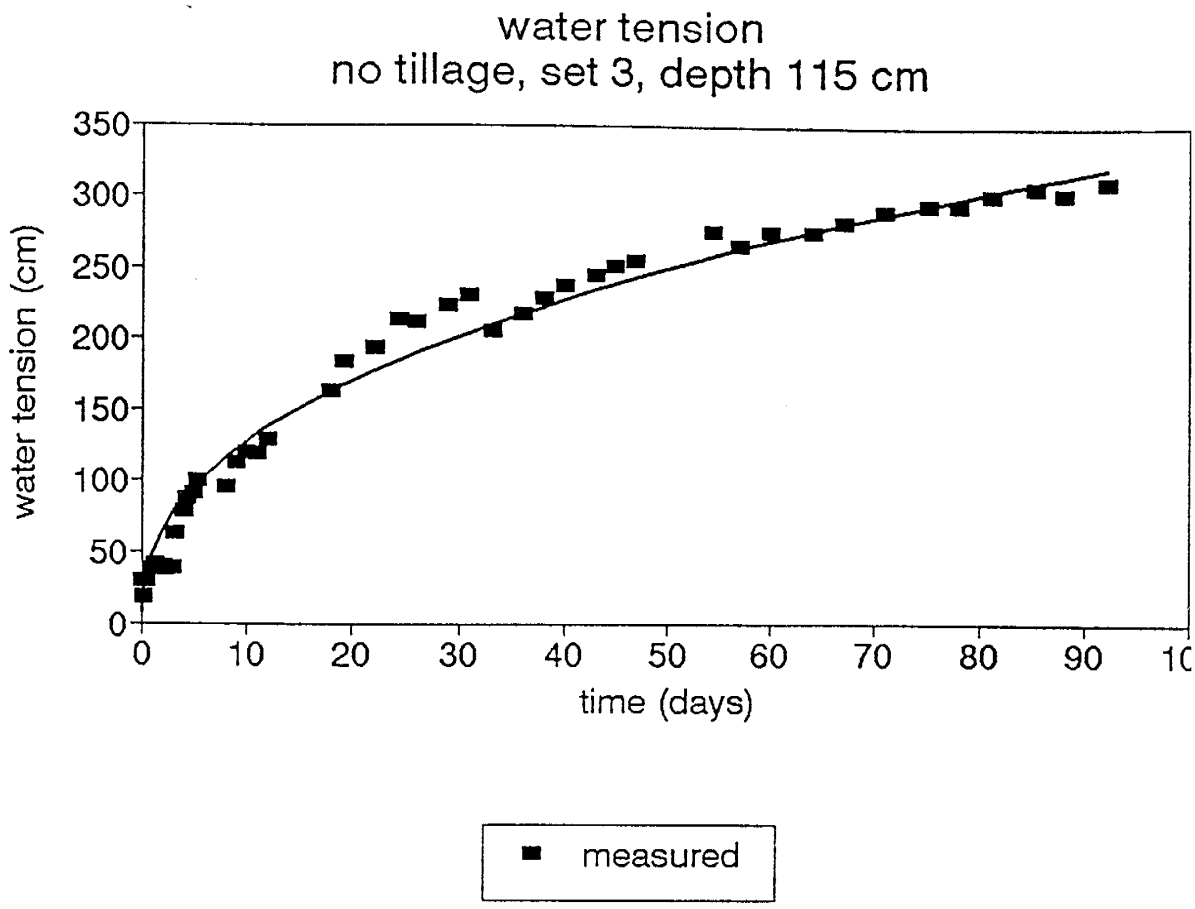

water content
no tillage, set 3, depth 40 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

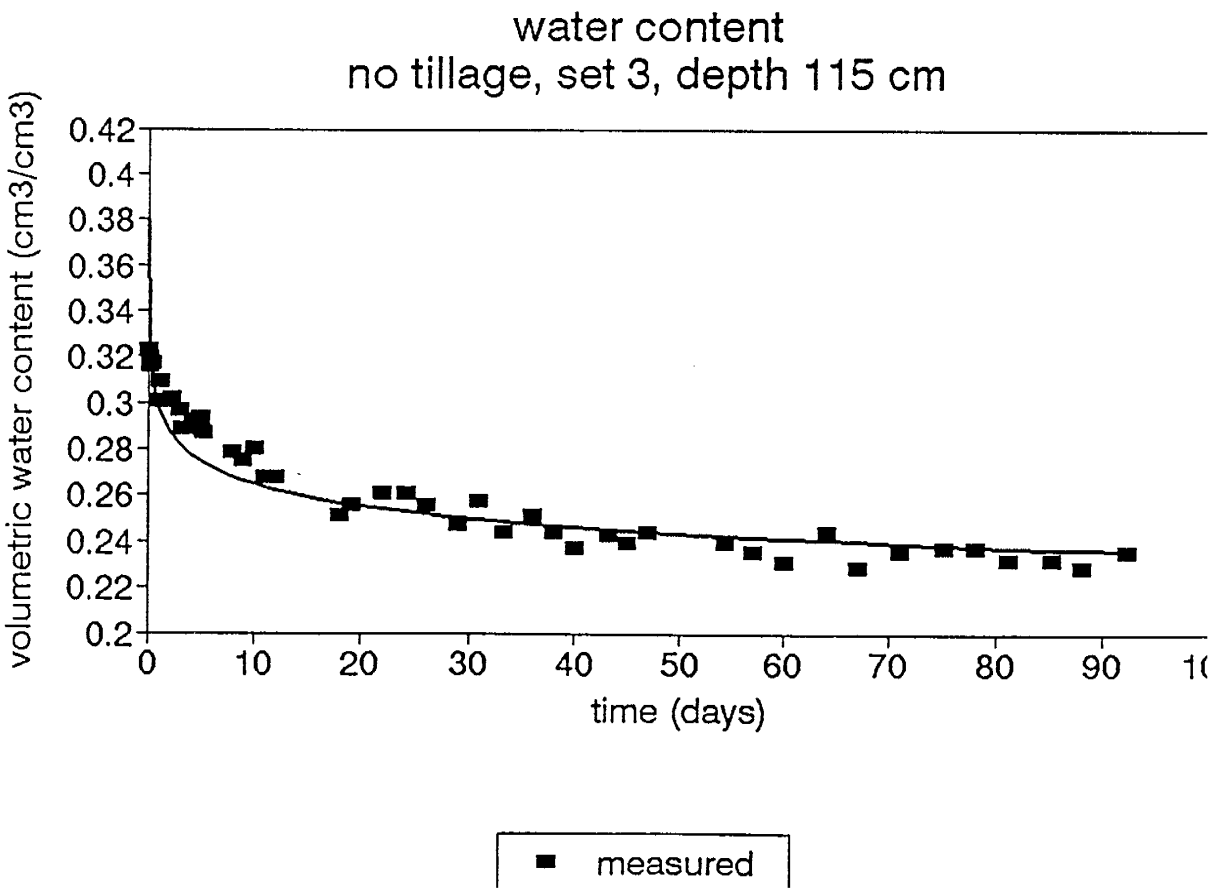

water tension
no tillage, set 3, depth 65 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
time (days)
measured

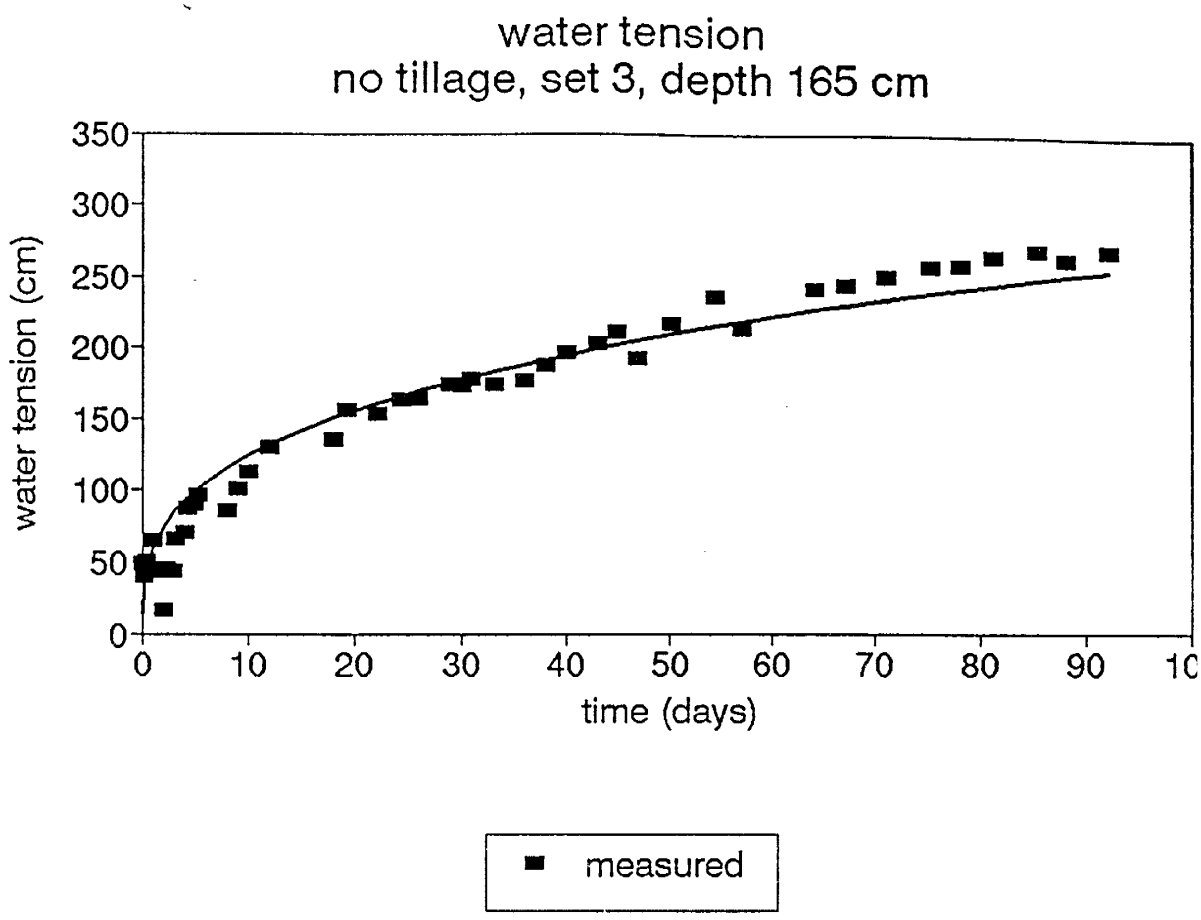

water content
no tillage, set 3, depth 65 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
time (days)
measured

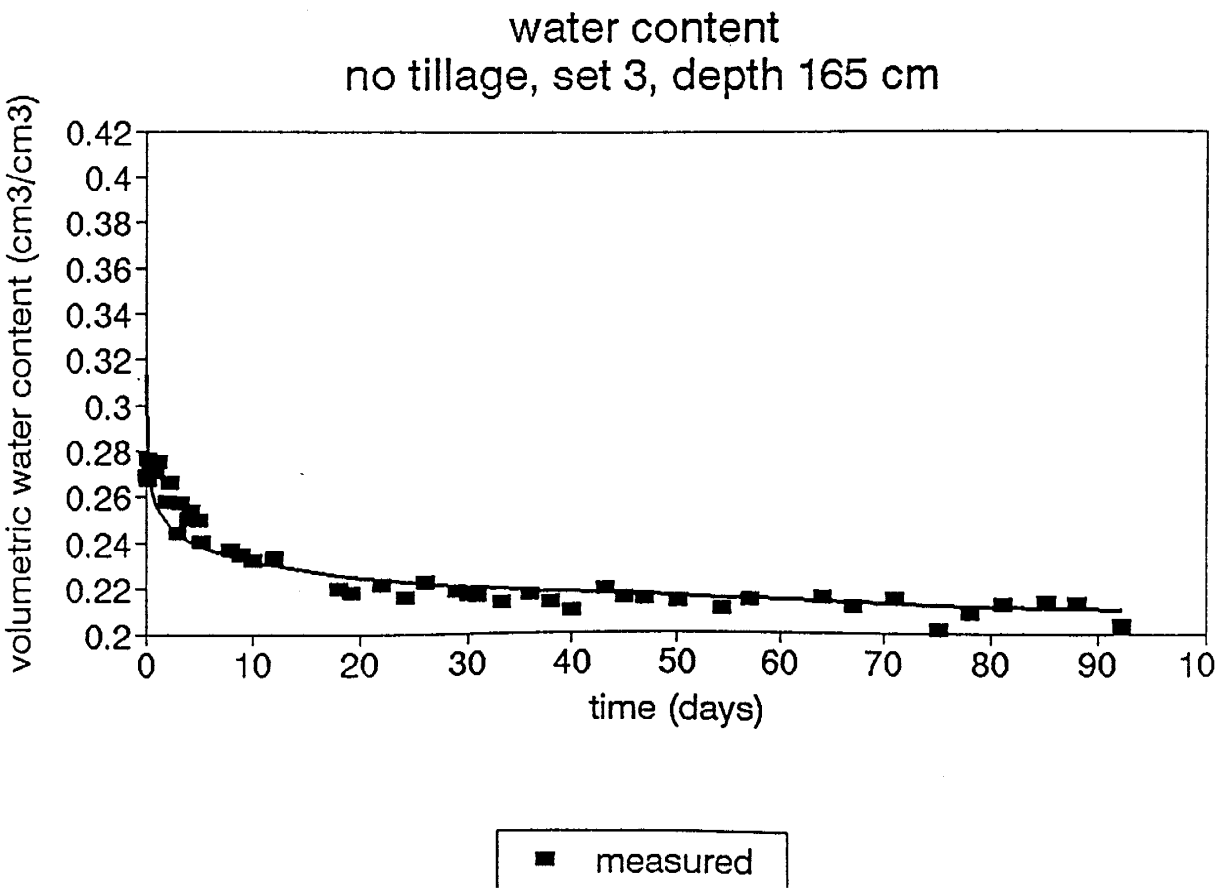

water tension
no tillage, set 3, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

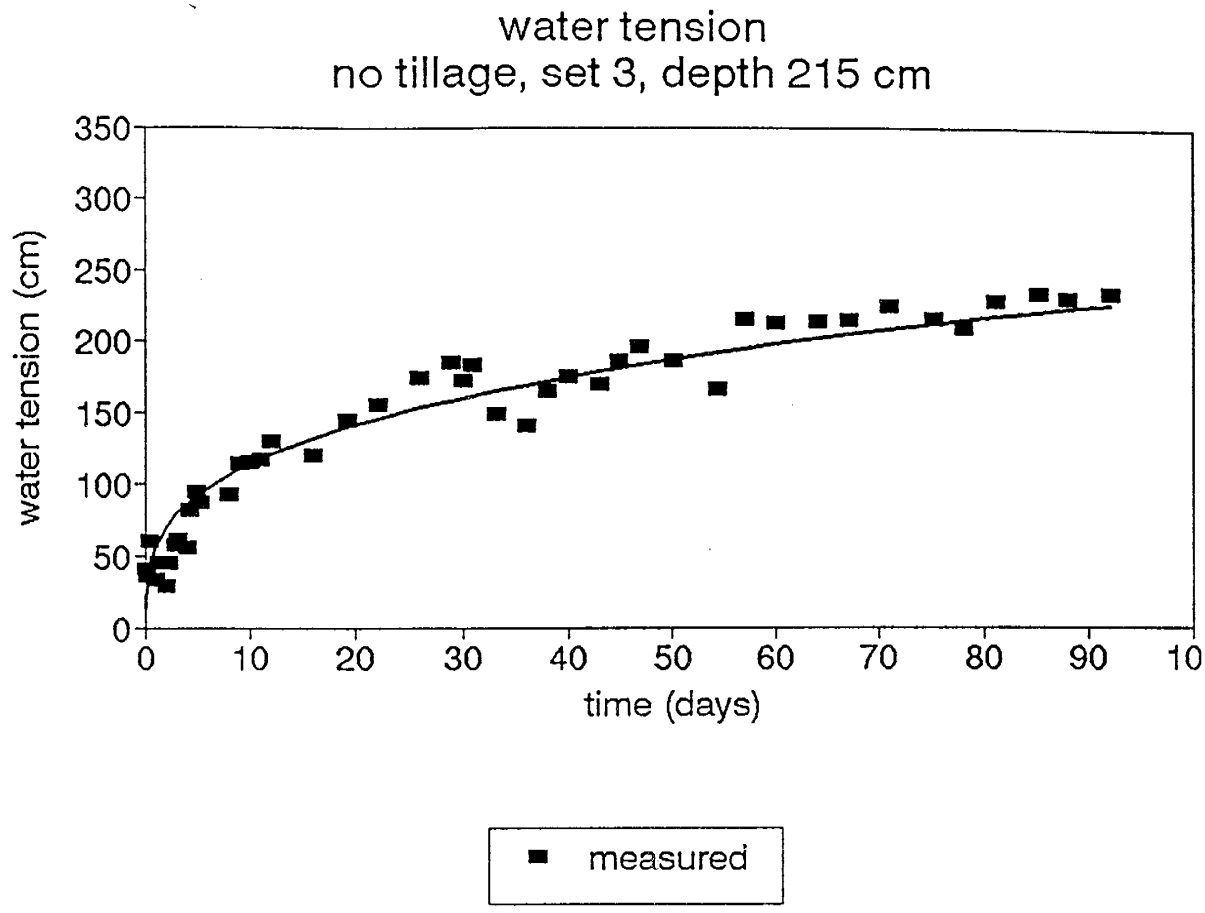

water content
no tillage, set 3, depth 90 cm
volumetric water content (cm3/cm3)
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

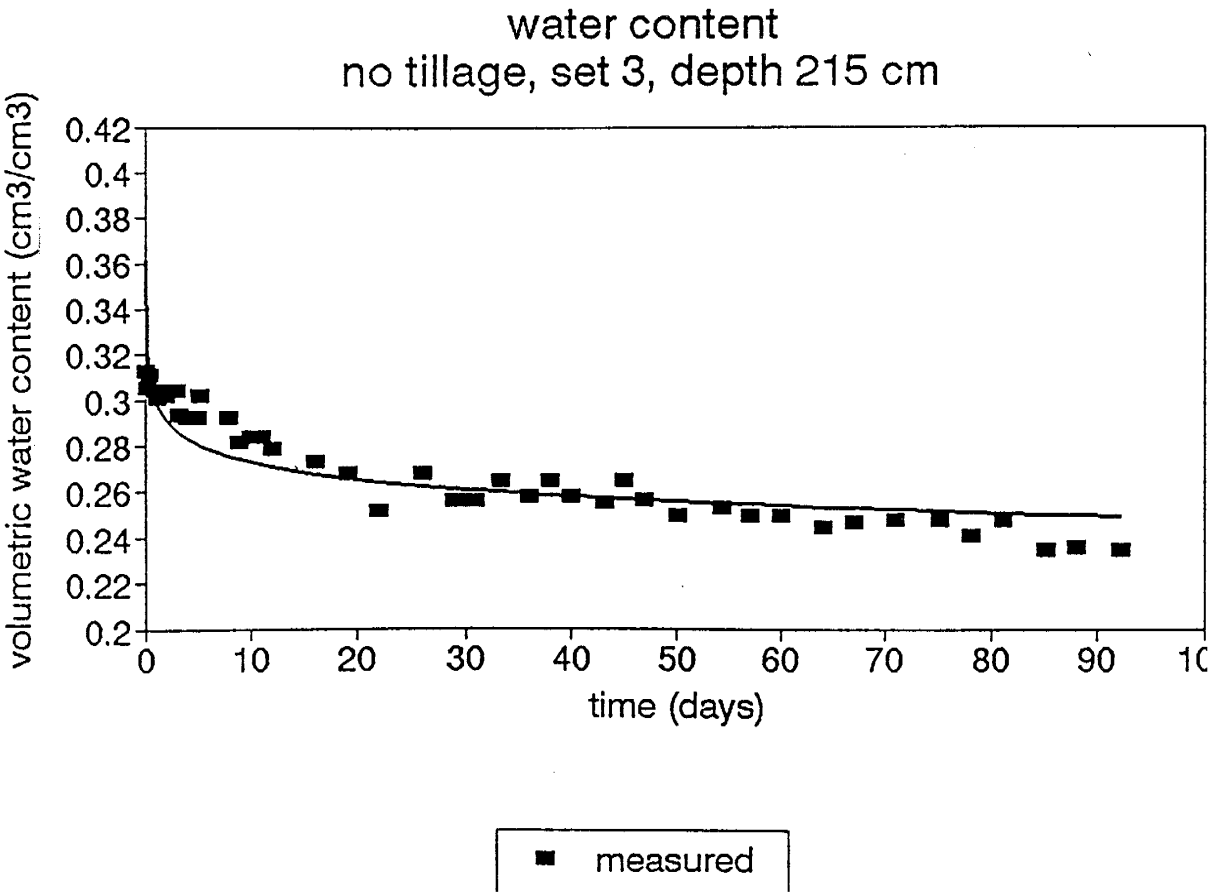

water tension
no tillage, set 3, depth 115 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

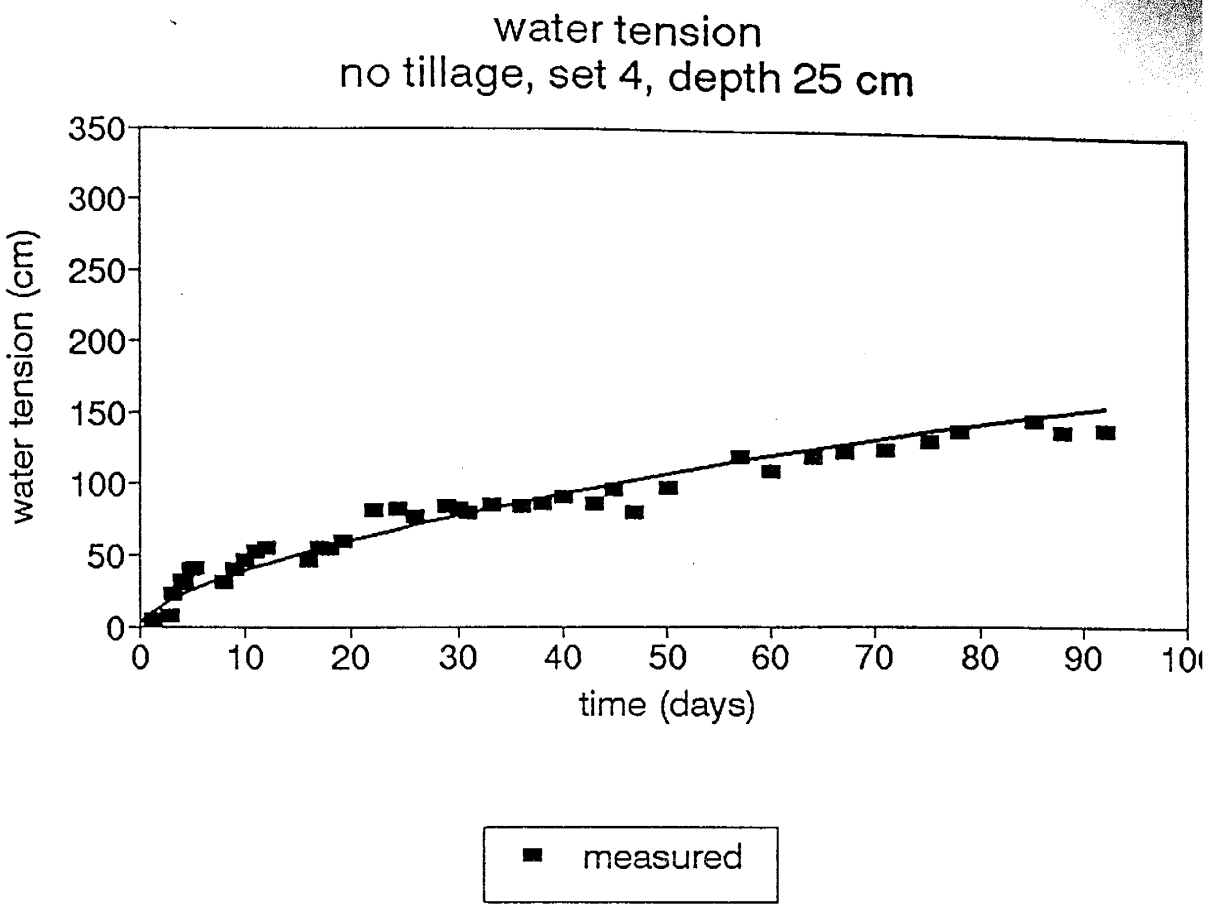

water content
no tillage, set 3, depth 115 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

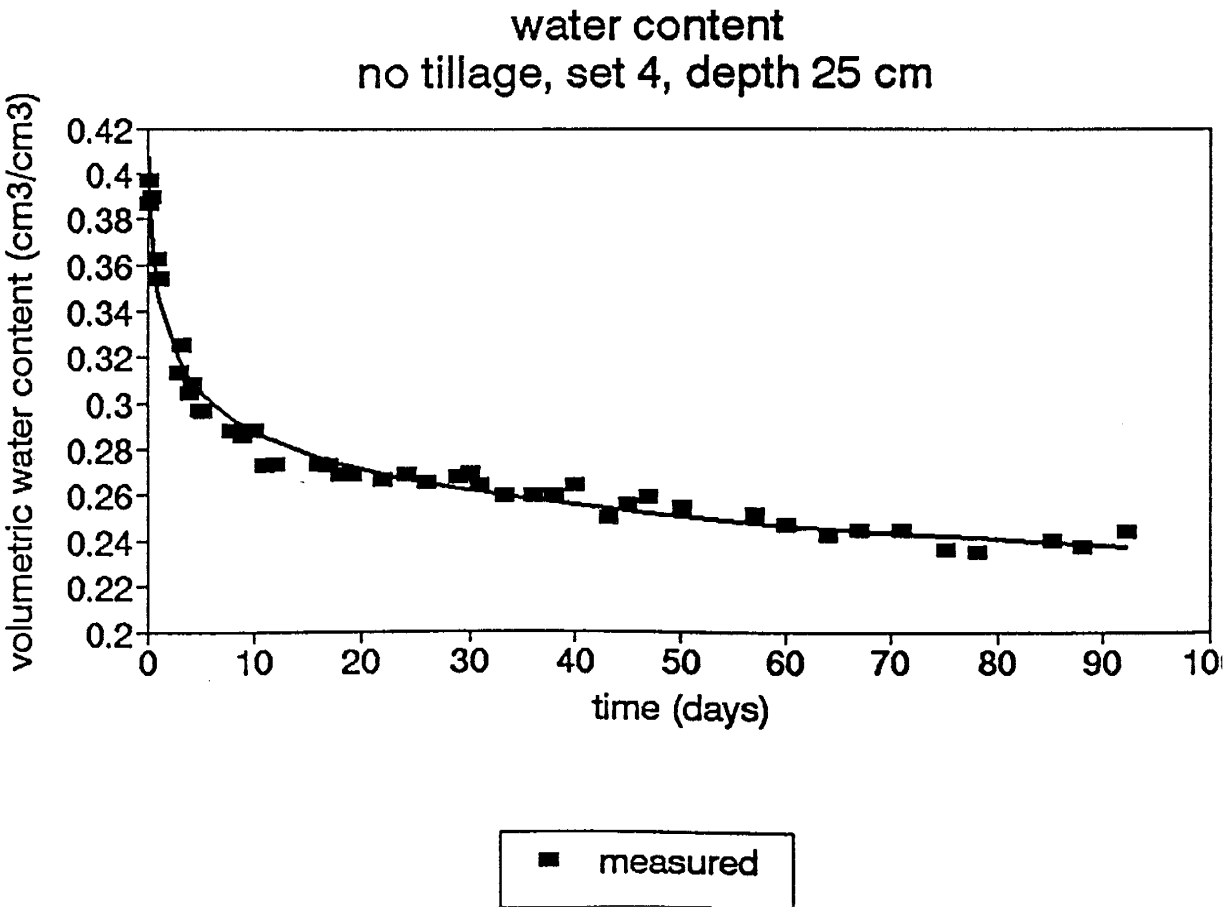

water tension
no tillage, set 3, depth 165 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

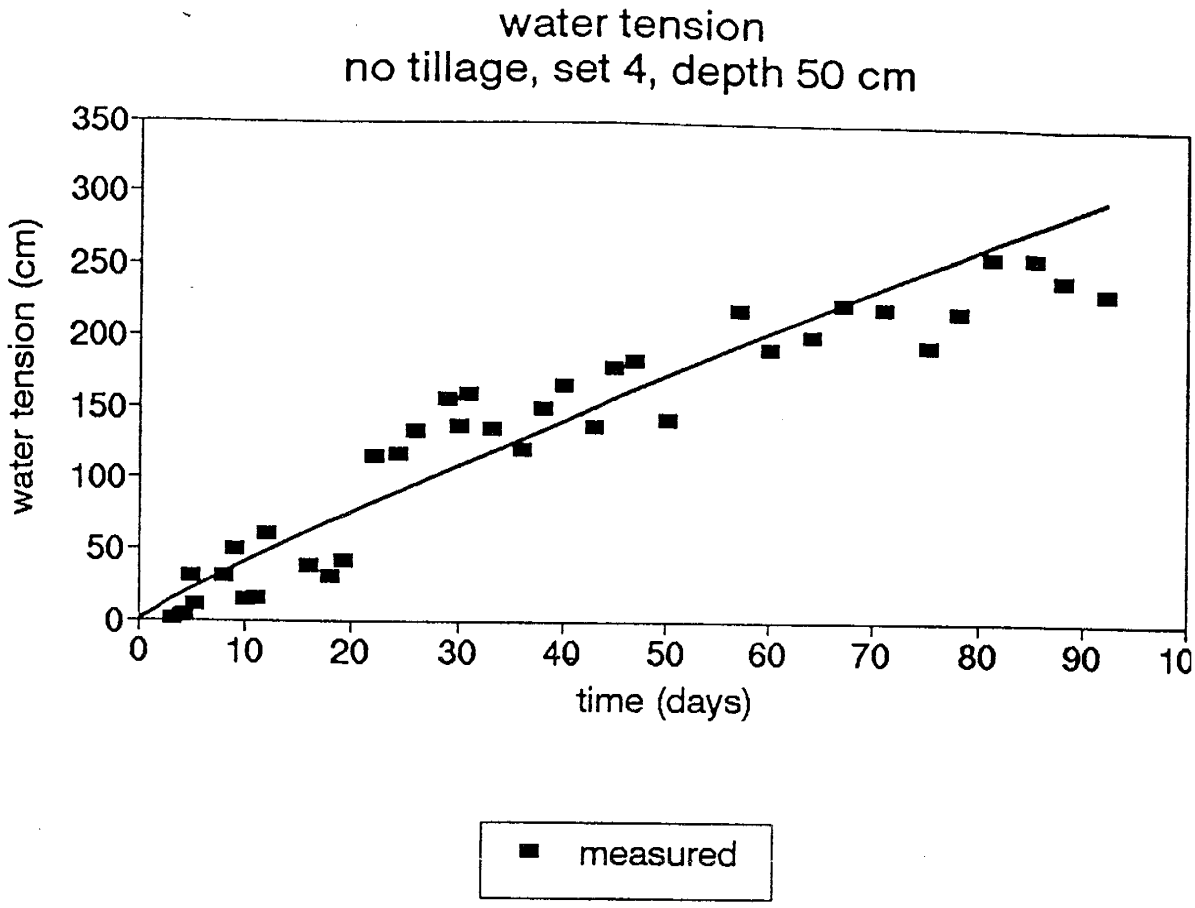

water content
no tillage, set 3, depth 165 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

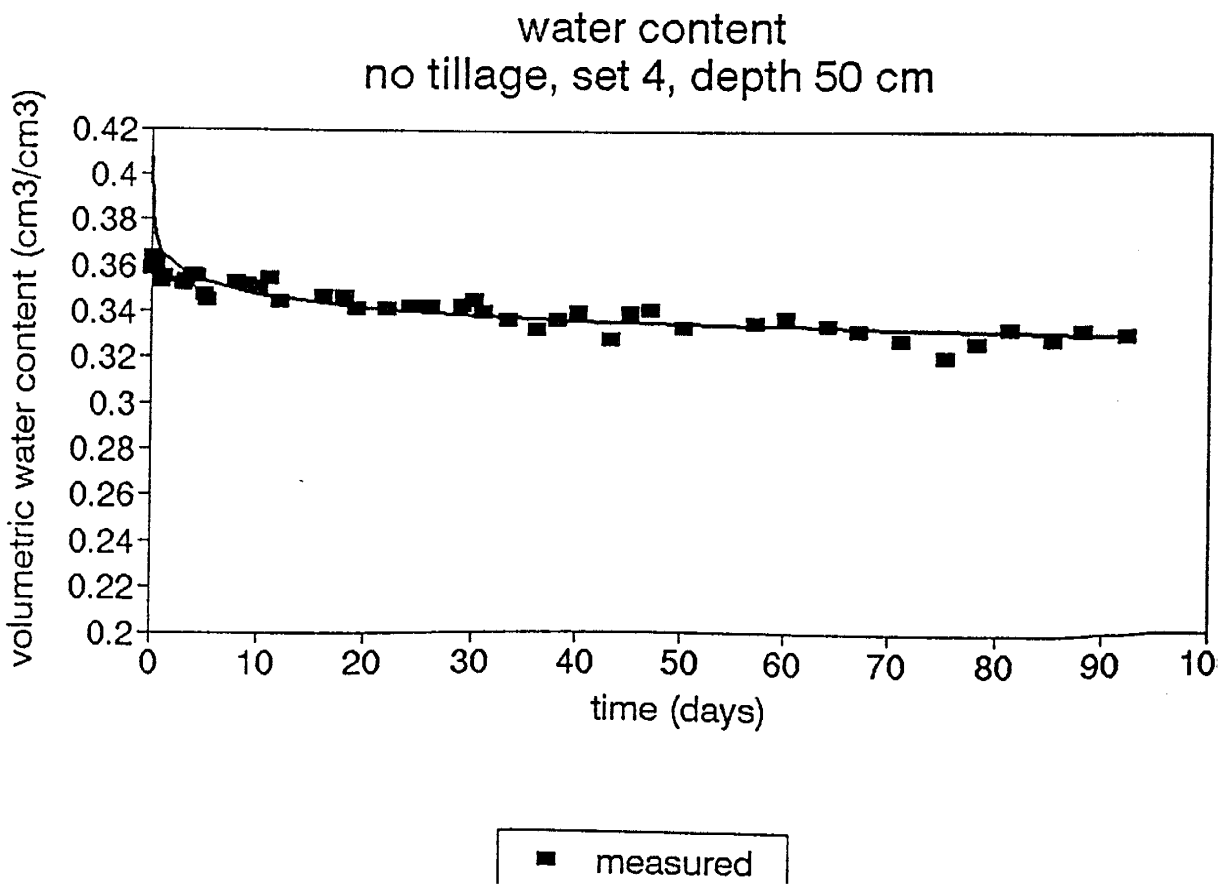

water tension
no tillage, set 3, depth 215 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

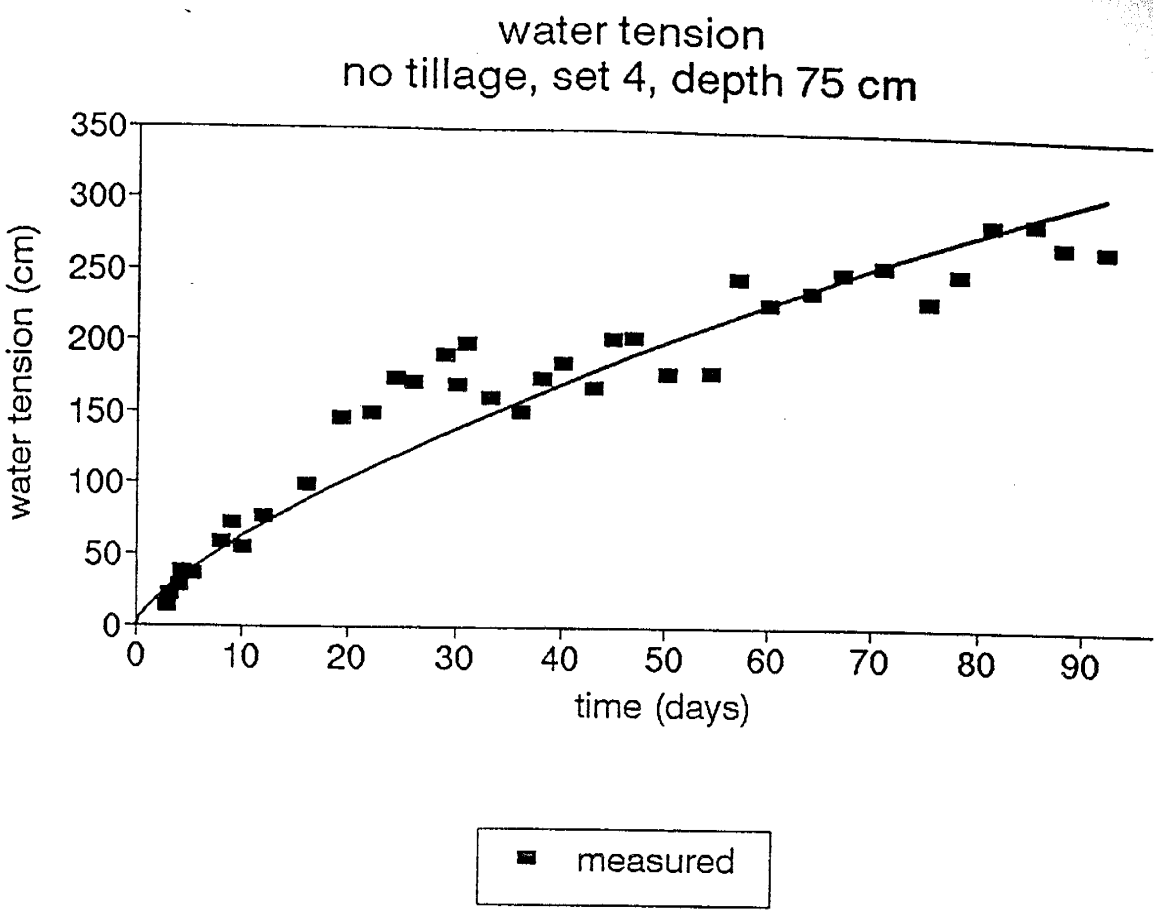

water content
no tillage, set 3, depth 215 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
1C
time (days)
measured

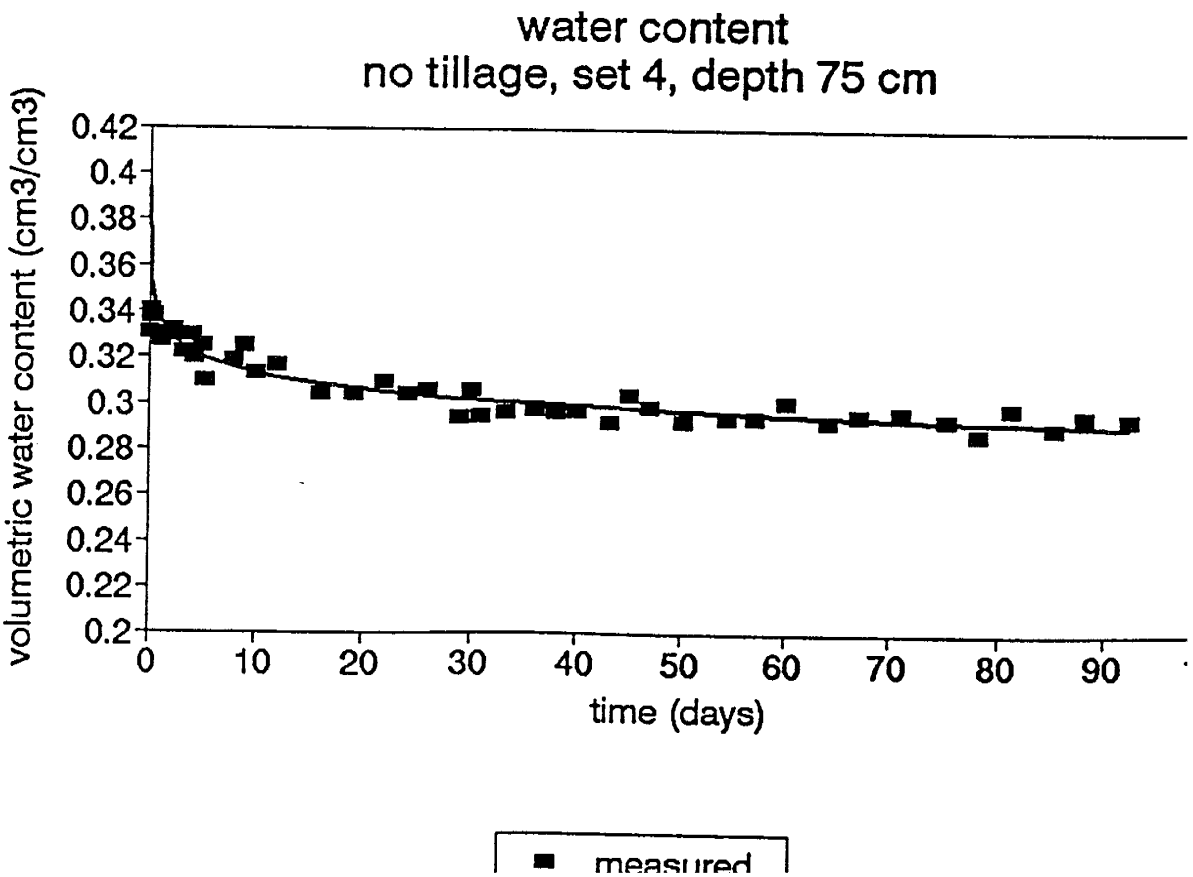

water tension
no tillage, set 4, depth 25 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

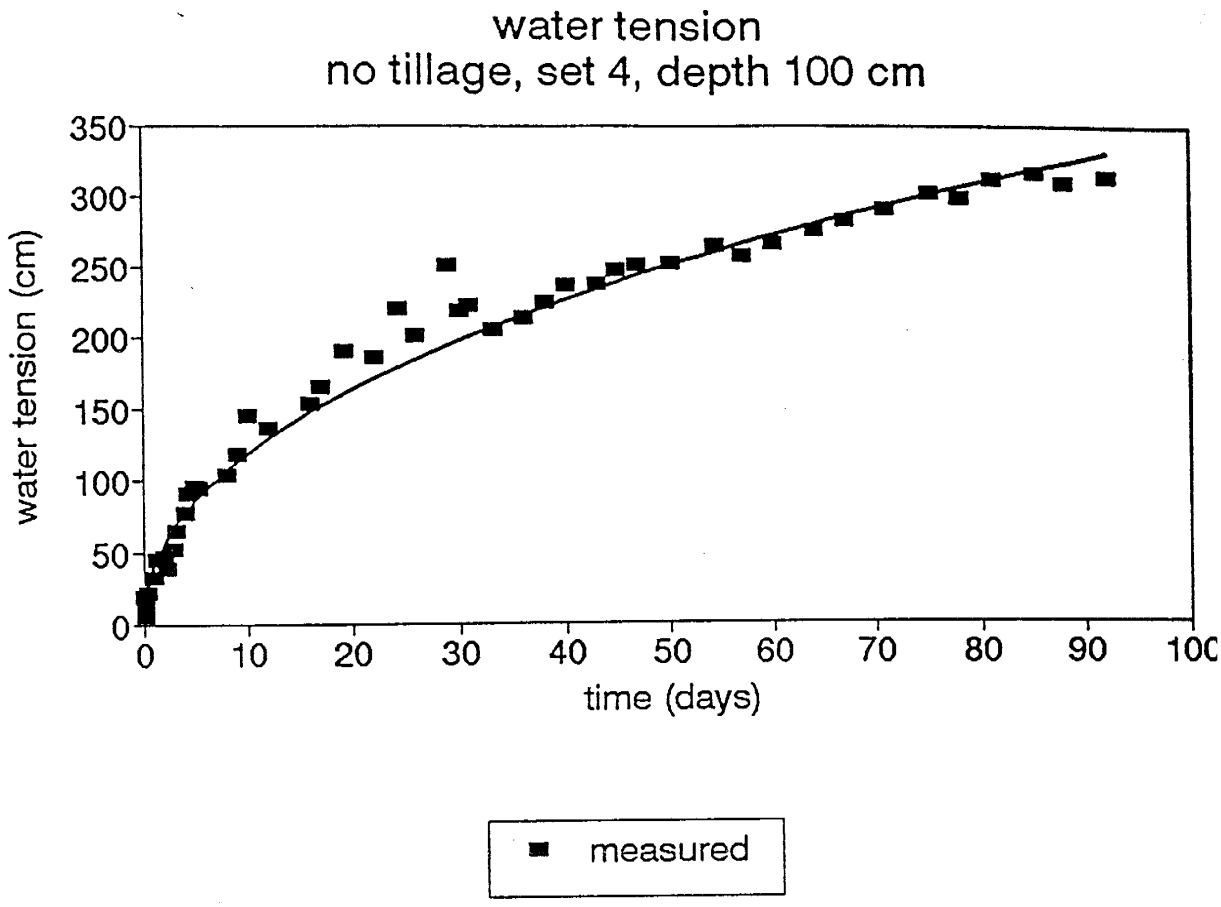

water content
no tillage, set 4, depth 25 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

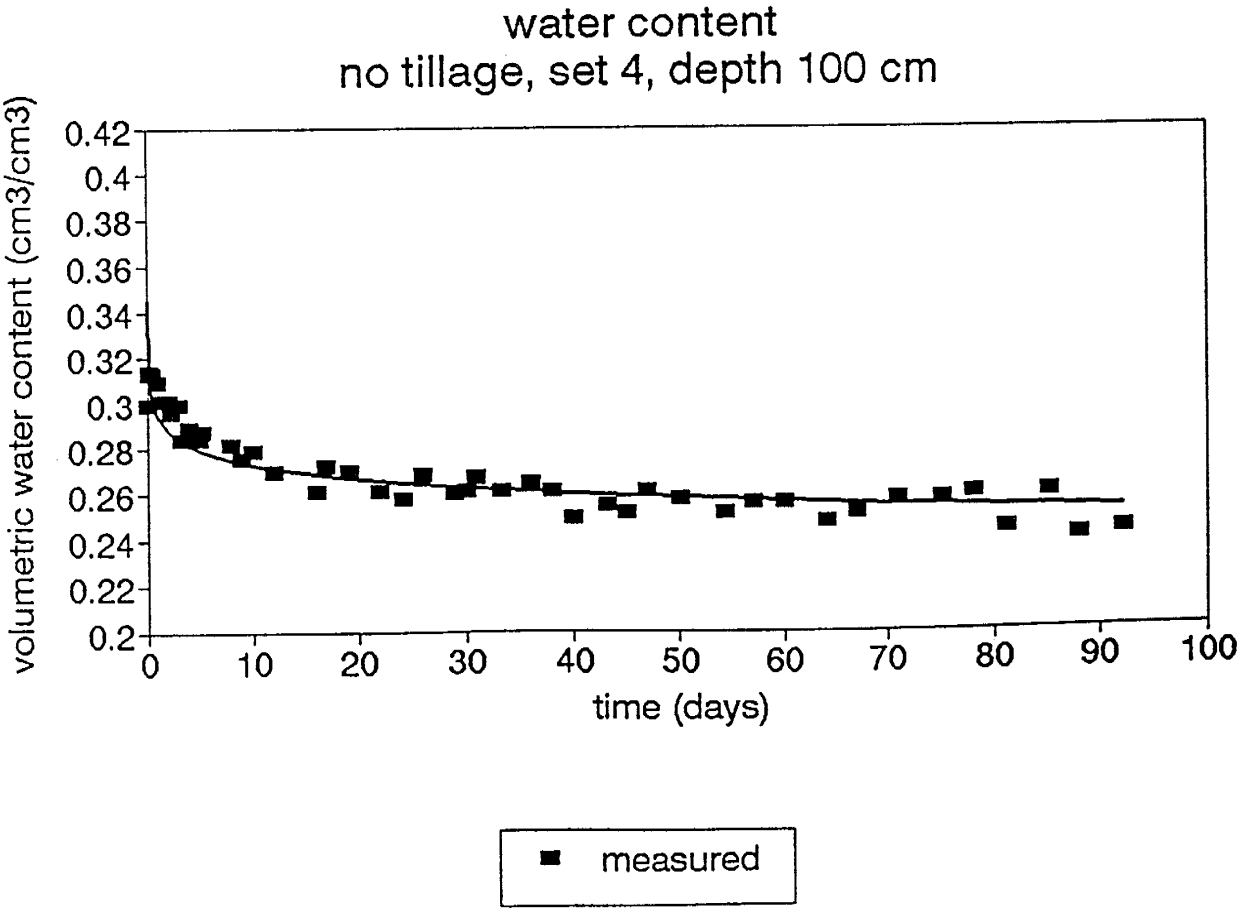

water tension
no tillage, set 4, depth 50 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

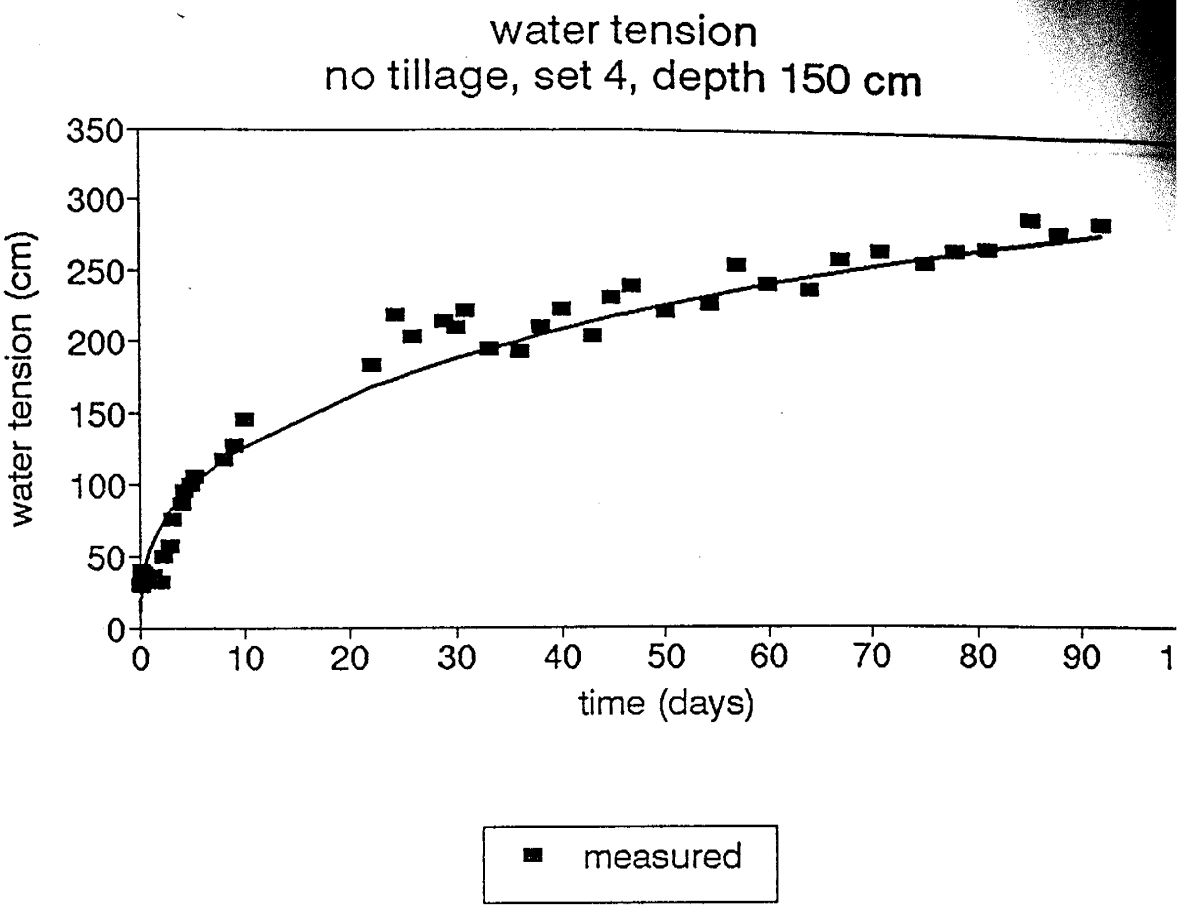

water content
no tillage, set 4, depth 50 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

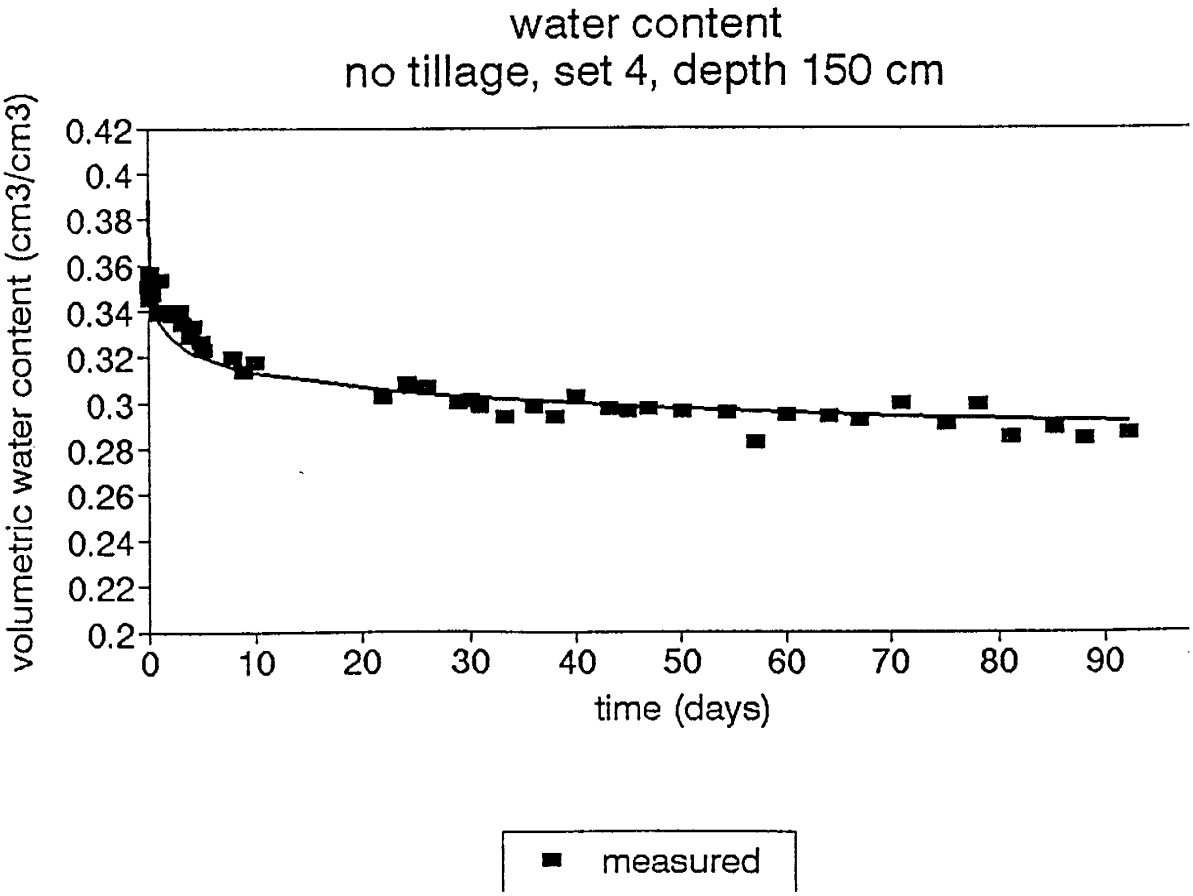

water tension
no tillage, set 4, depth 75 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

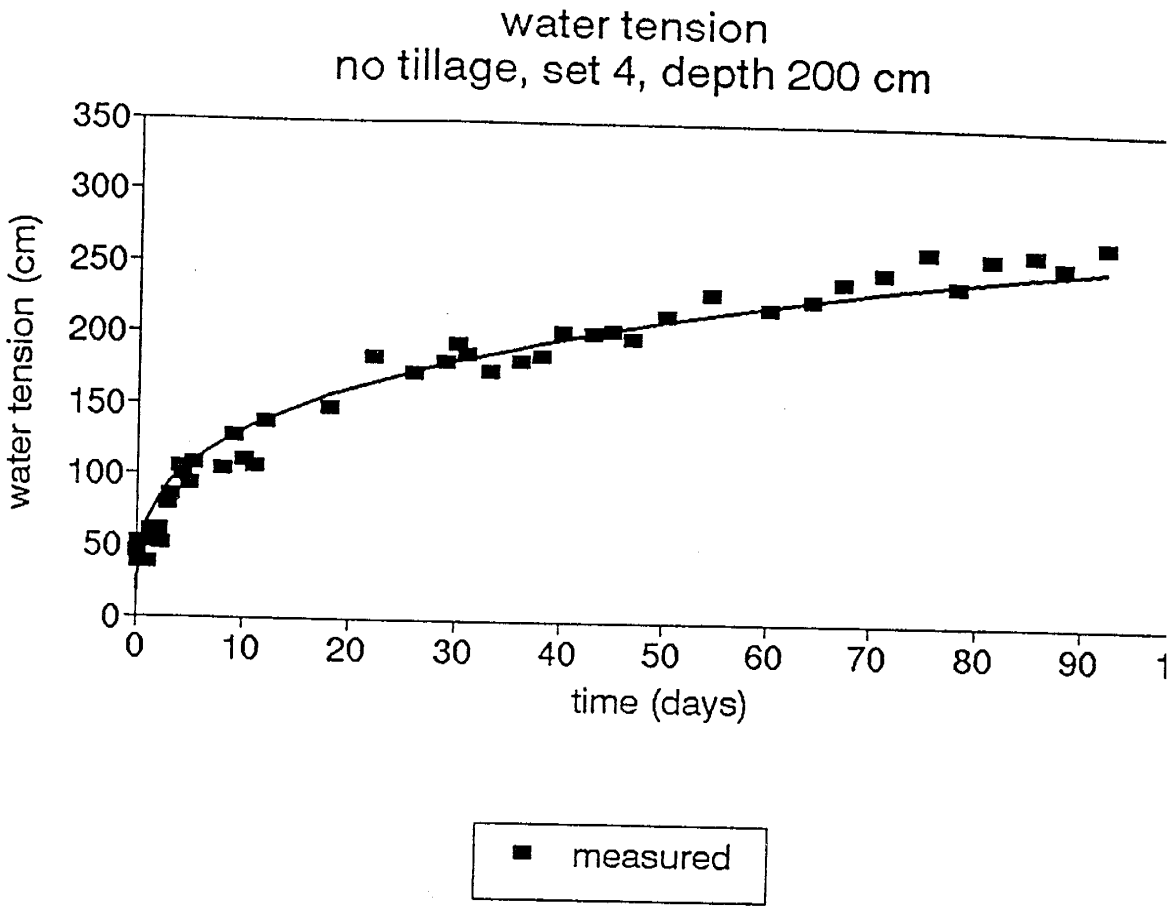

water content
no tillage, set 4, depth 75 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

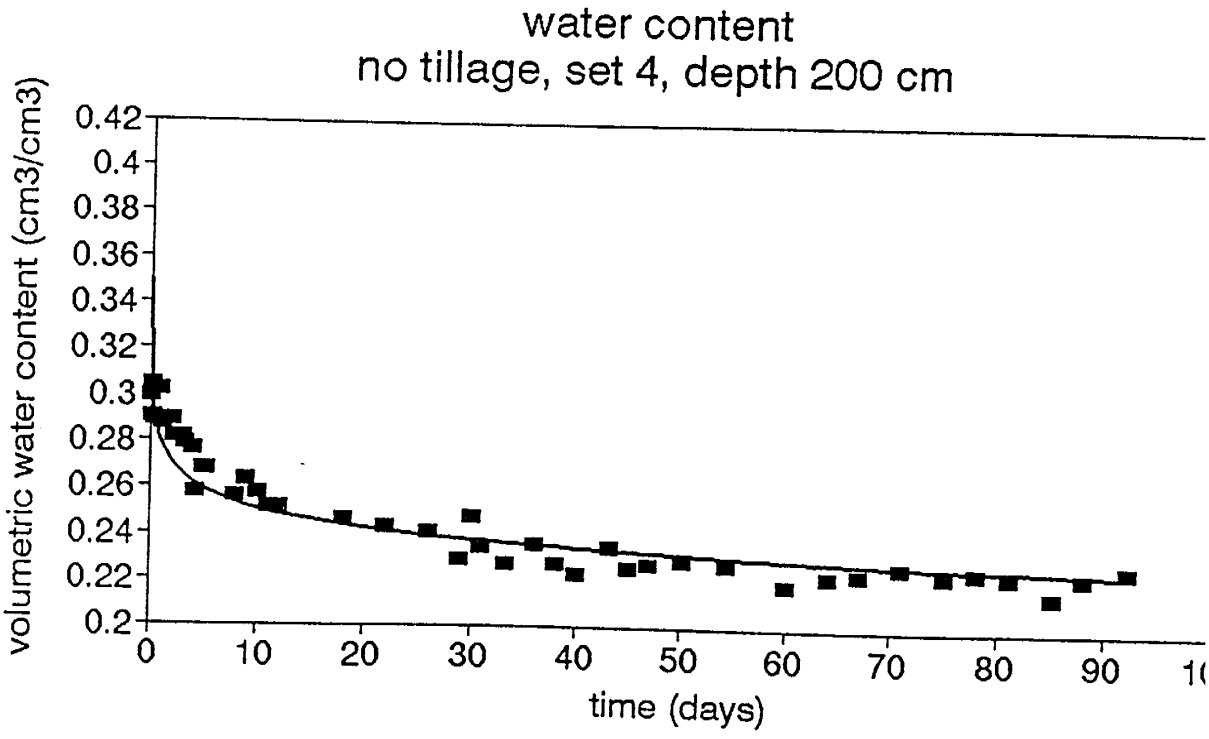

water tension
no tillage, set 4, depth 100 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

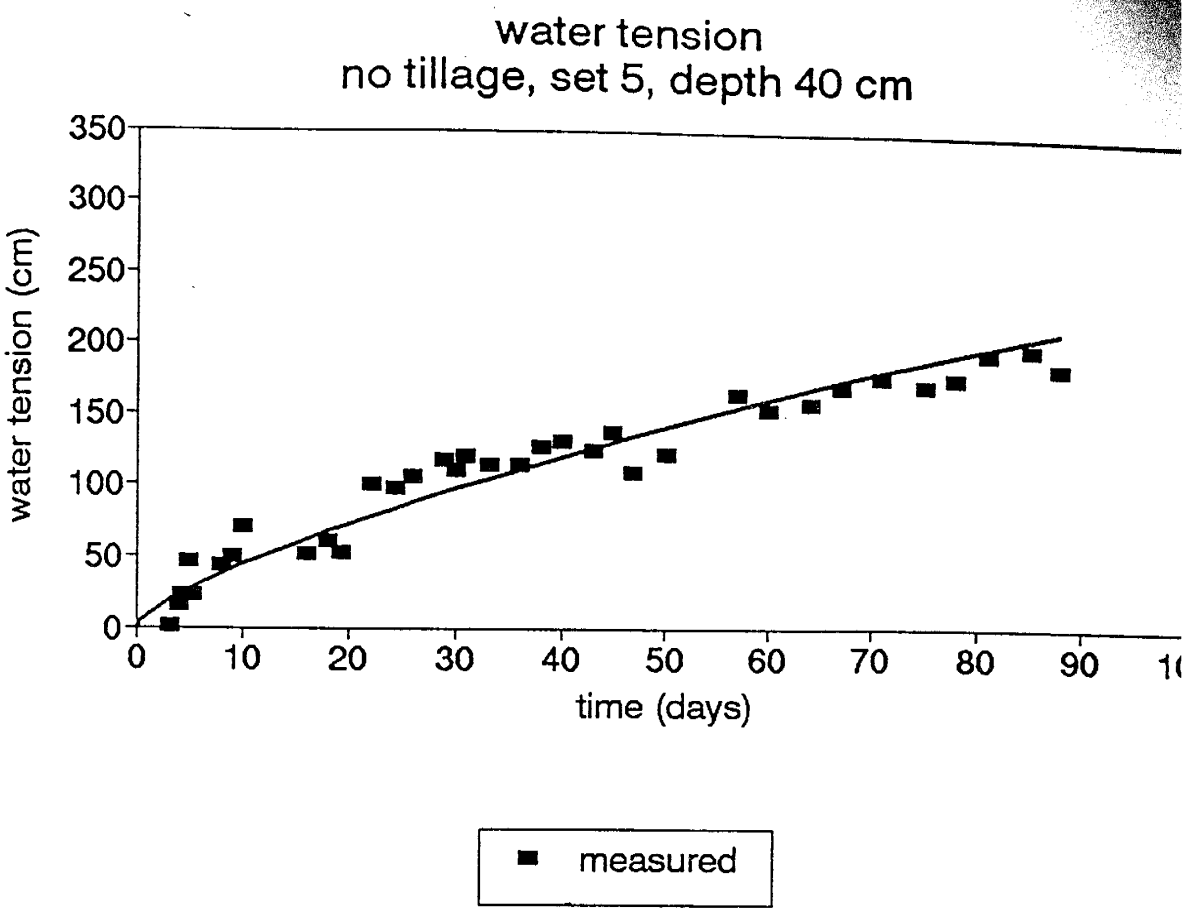

water content
no tillage, set 4, depth 100 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

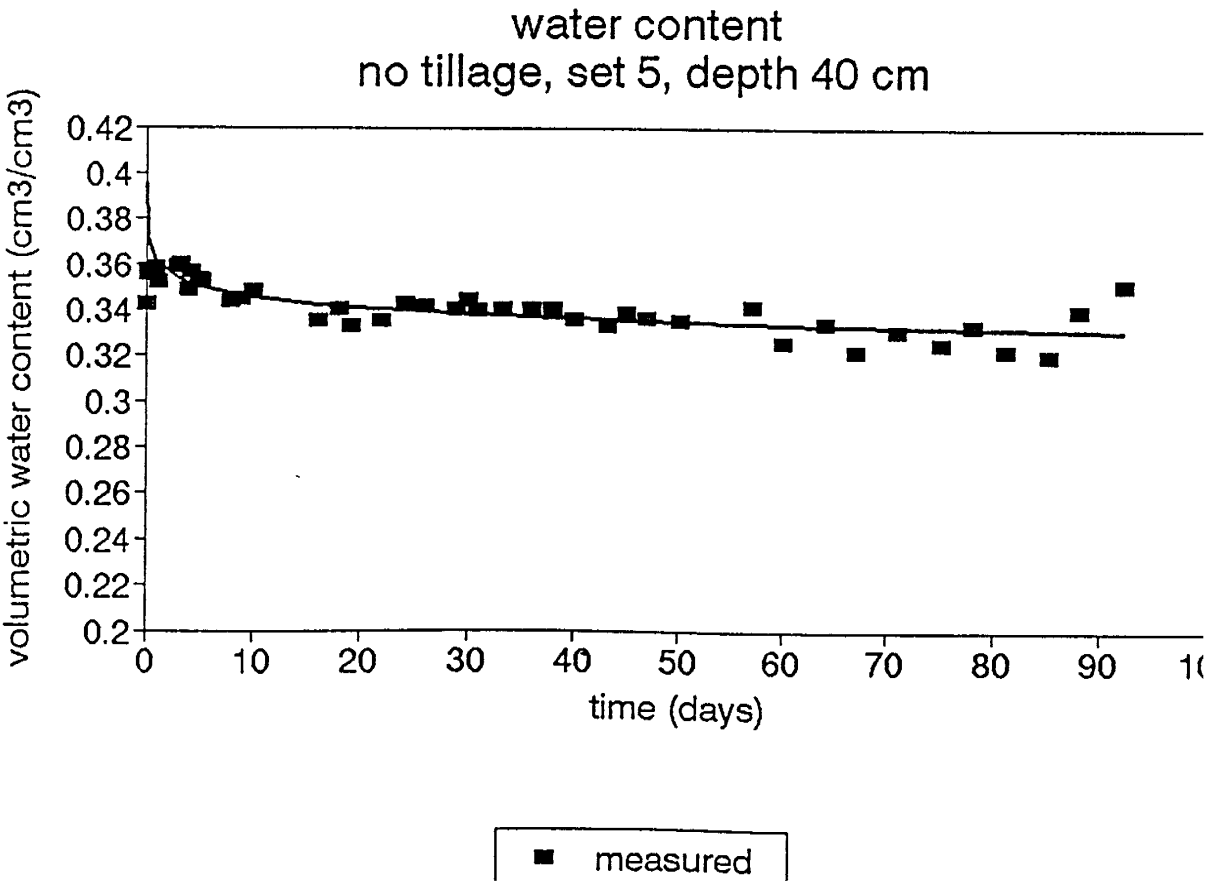

water tension
no tillage, set 4, depth 150 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
1
time (days)
measured

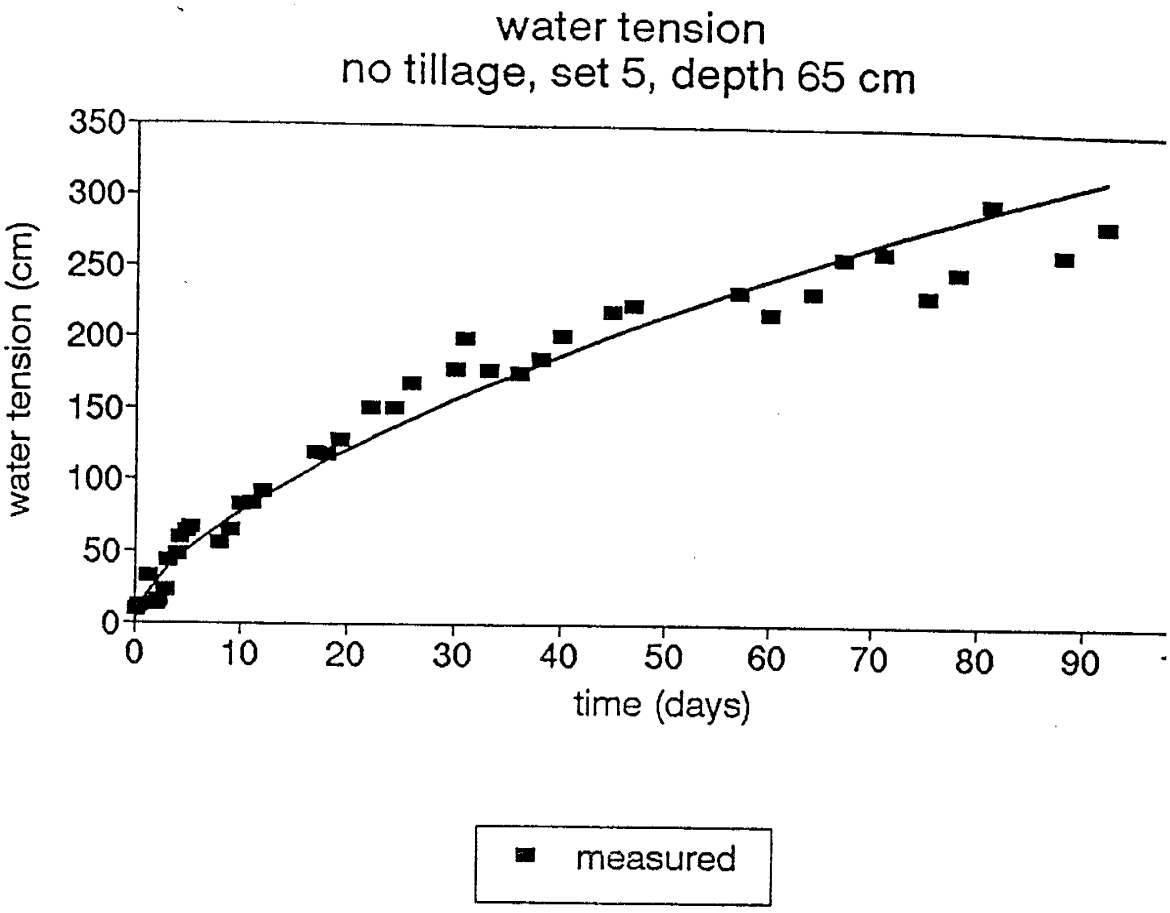

water content
no tillage, set 4, depth 150 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

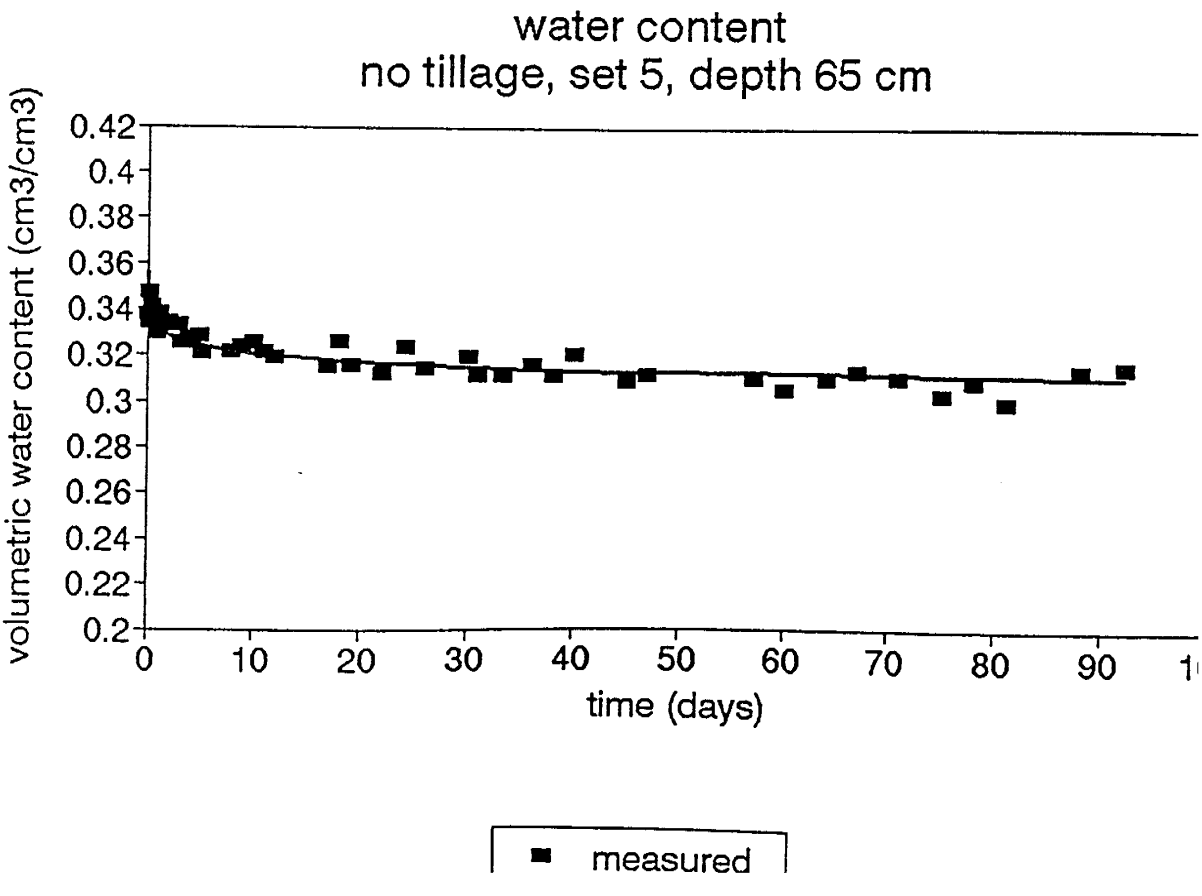

water tension
no tillage, set 4, depth 200 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

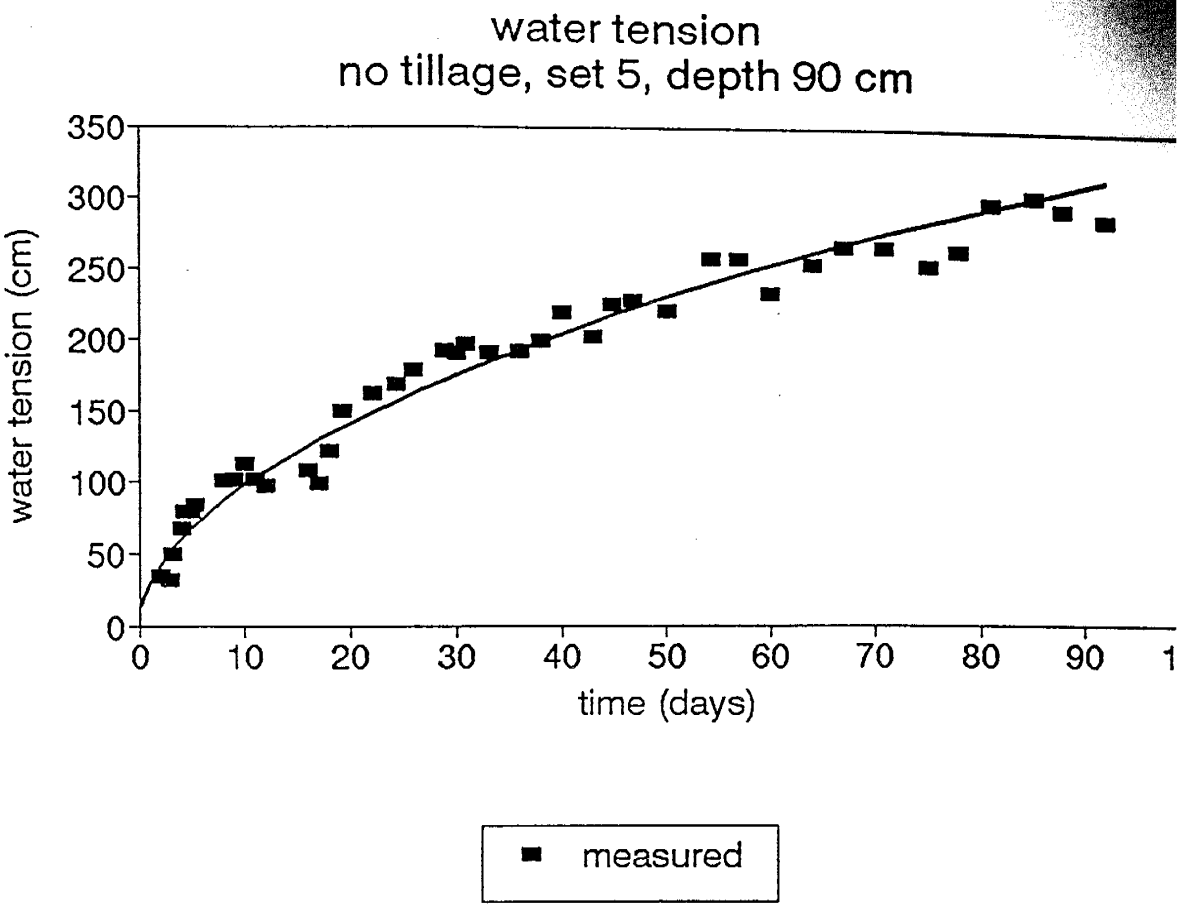

water content
no tillage, set 4, depth 200 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)

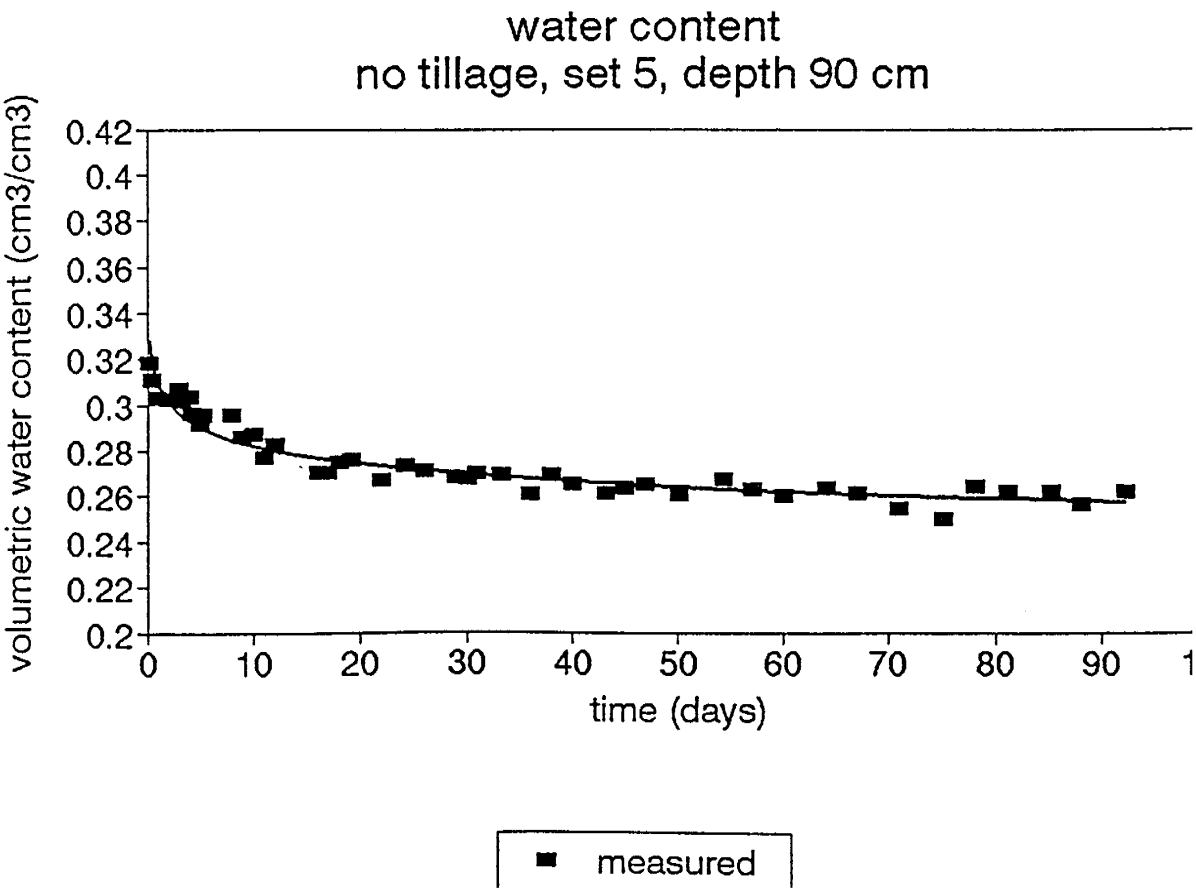

water tension
no tillage, set 5, depth 40 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

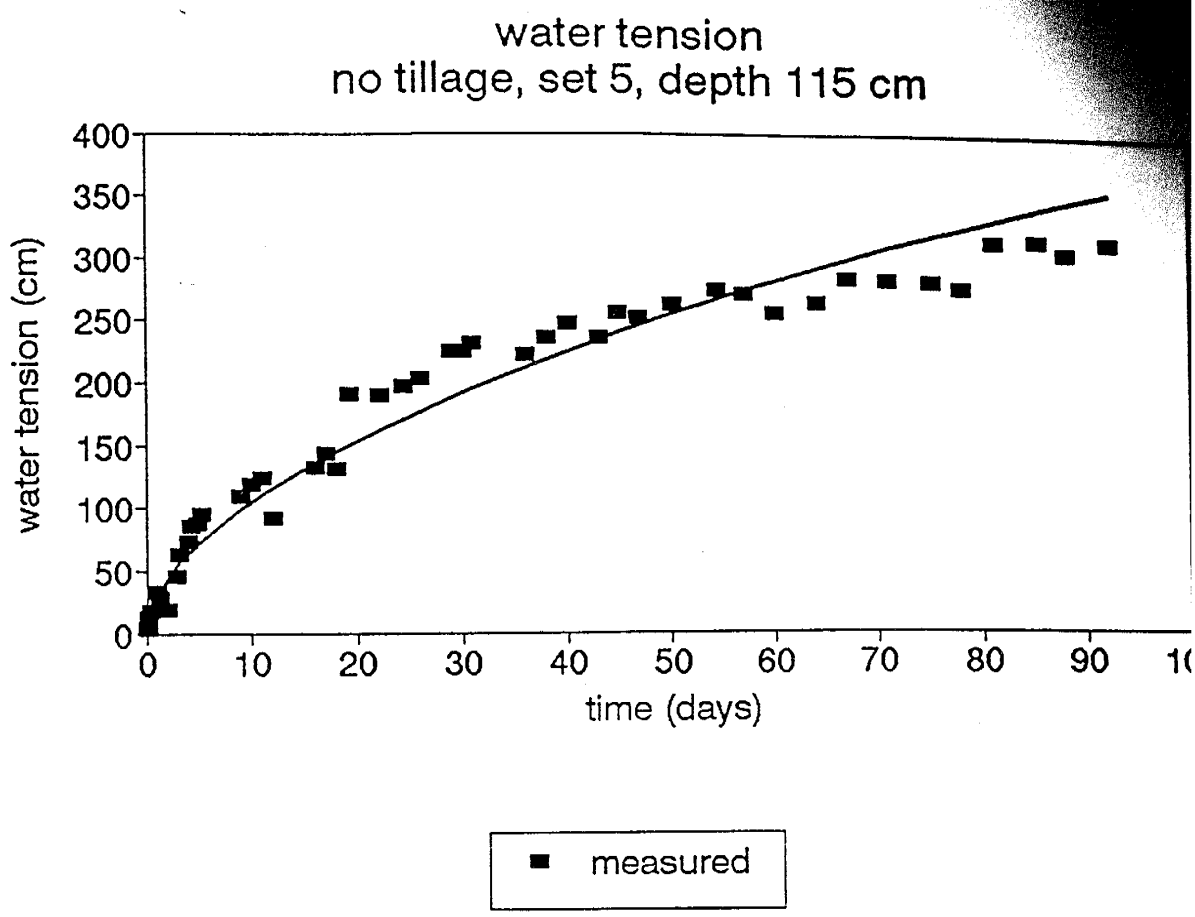

water content
no tillage, set 5, depth 40 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

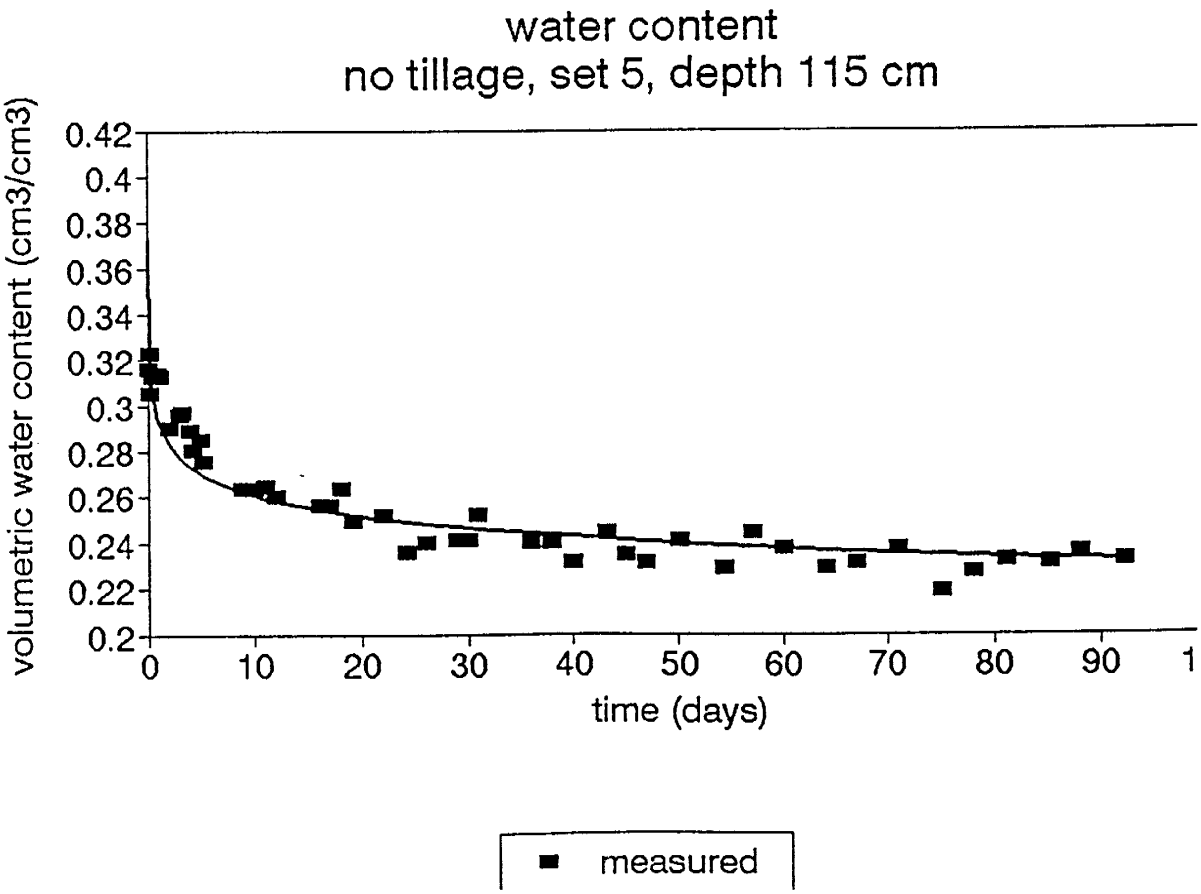

water tension
no tillage, set 5, depth 65 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

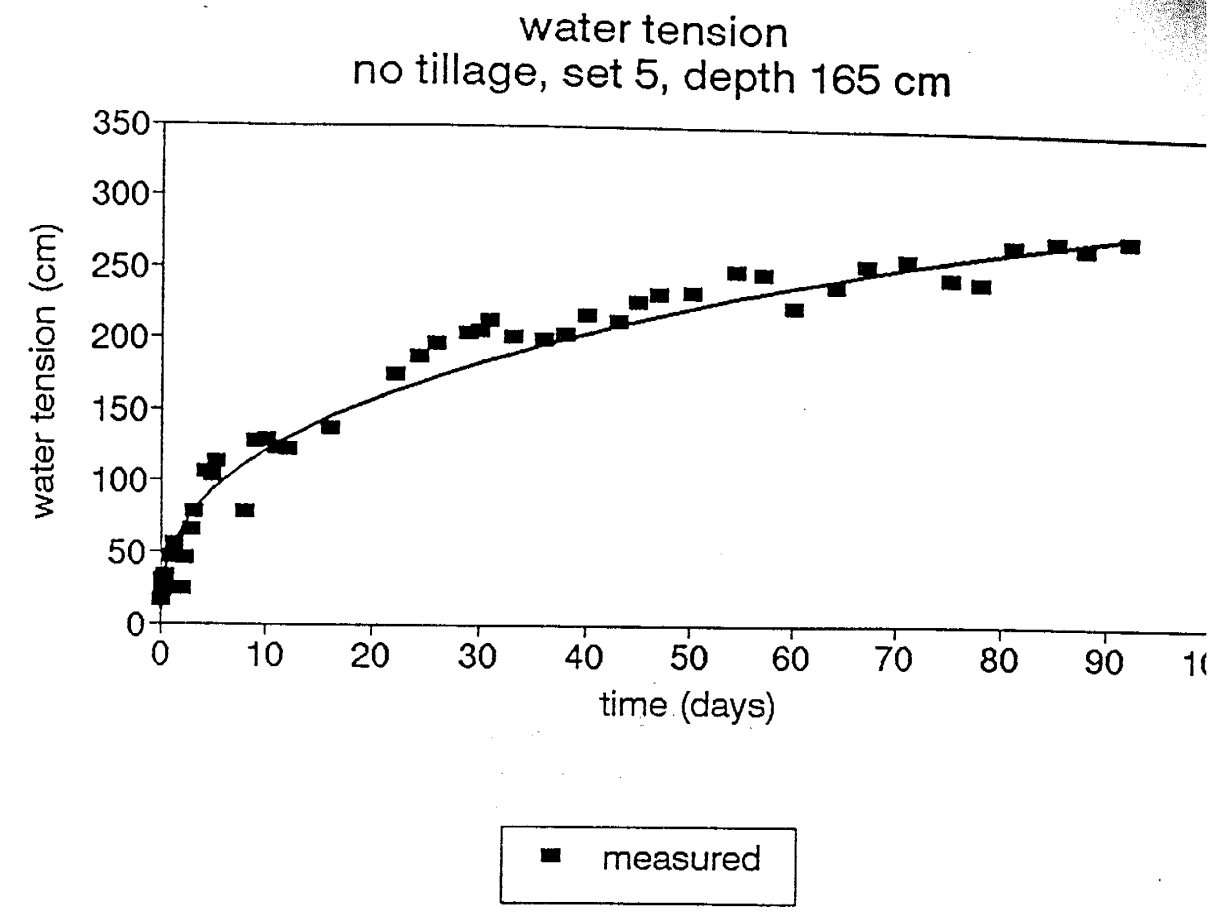

water content
no tillage, set 5, depth 65 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

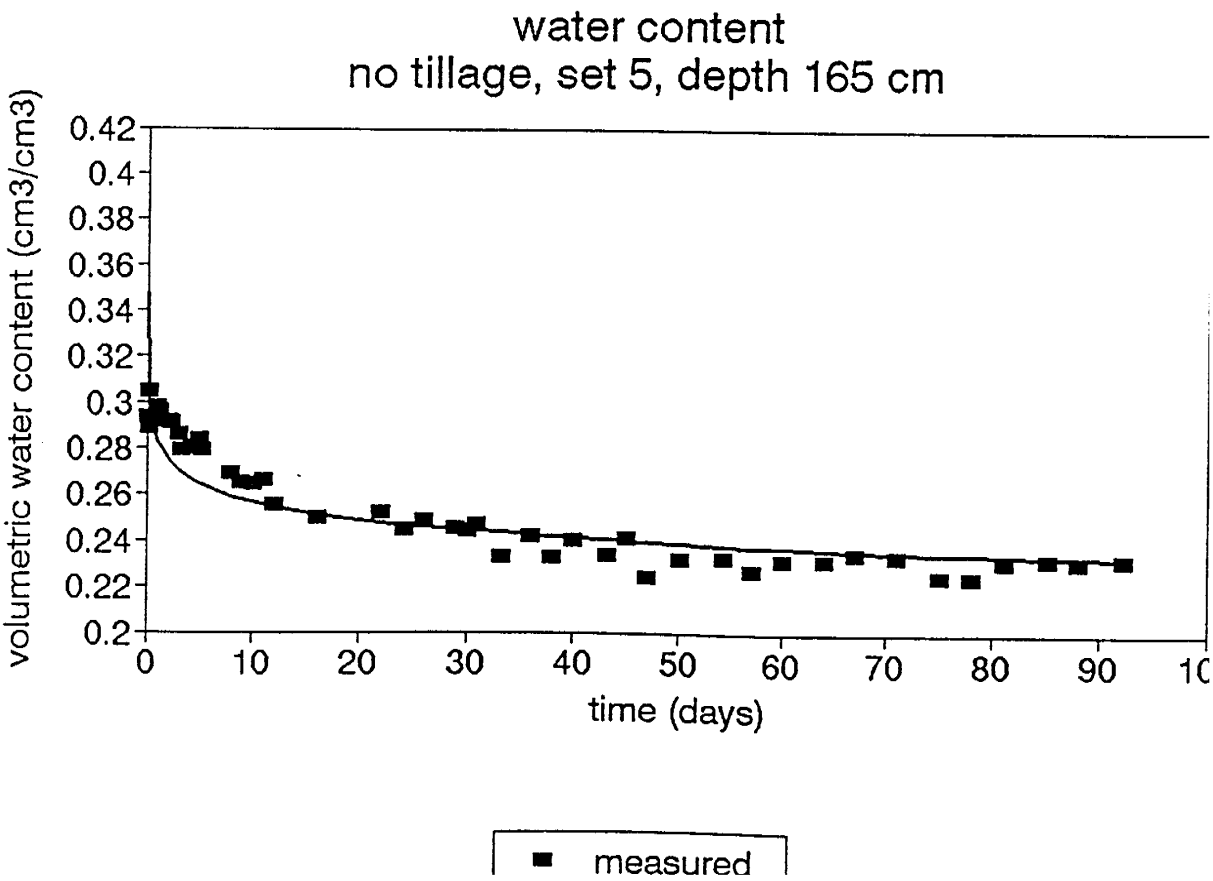

water tension
no tillage, set 5, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

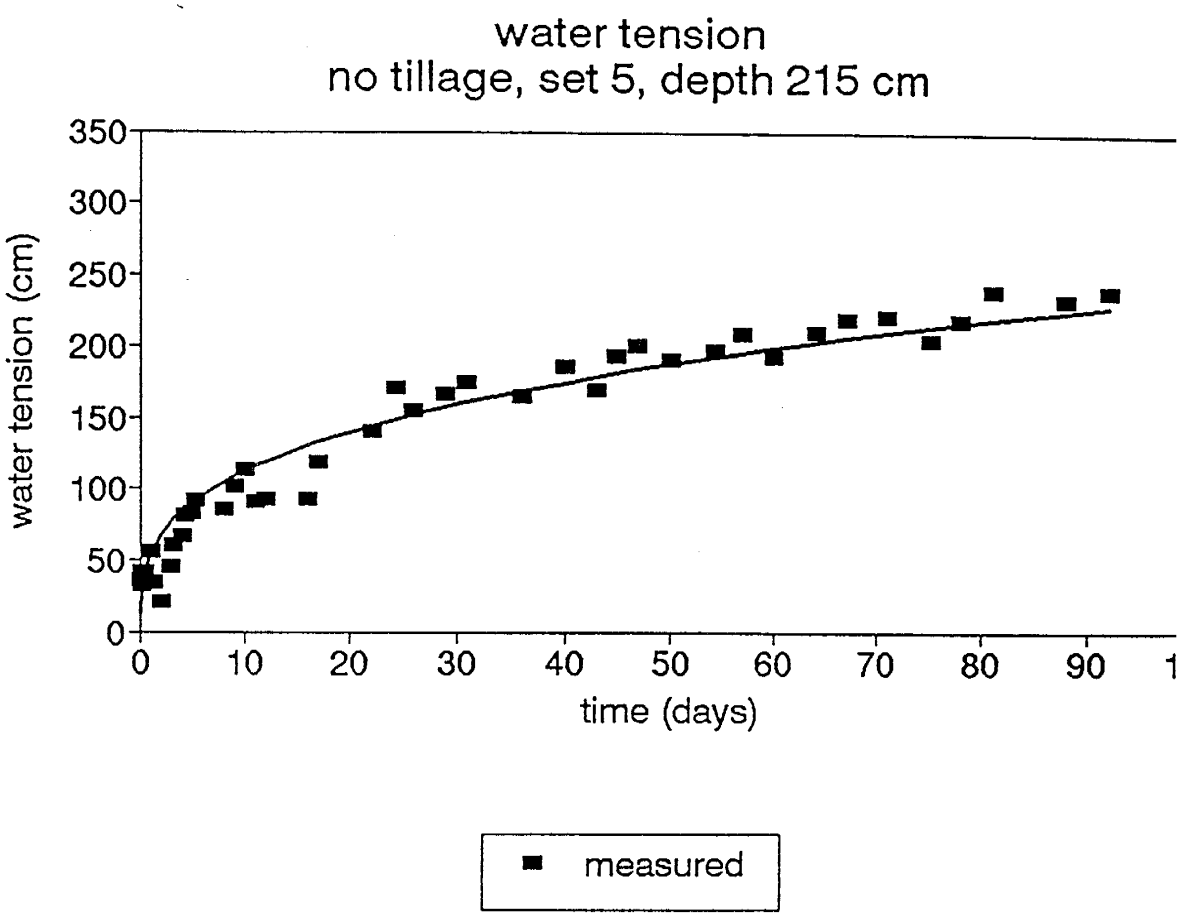

water content
no tillage, set 5, depth 90 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

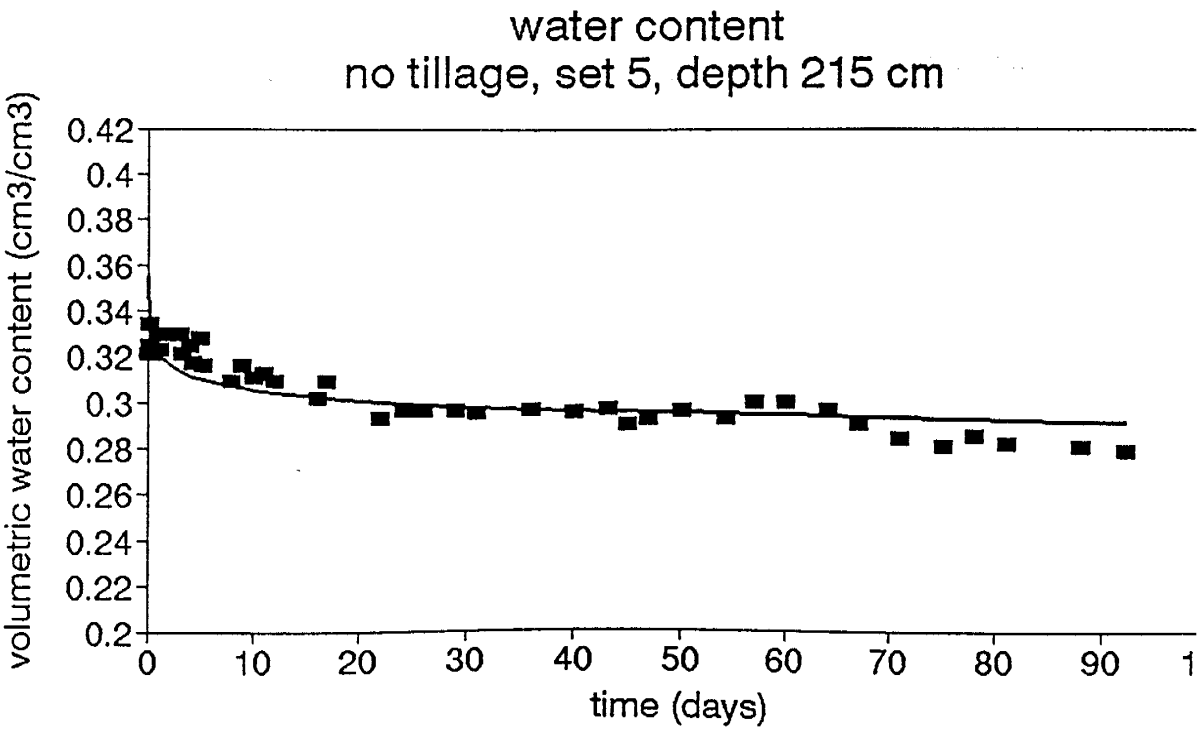

water tension
no tillage, set 5, depth 115 cm
water tension (cm)
400
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

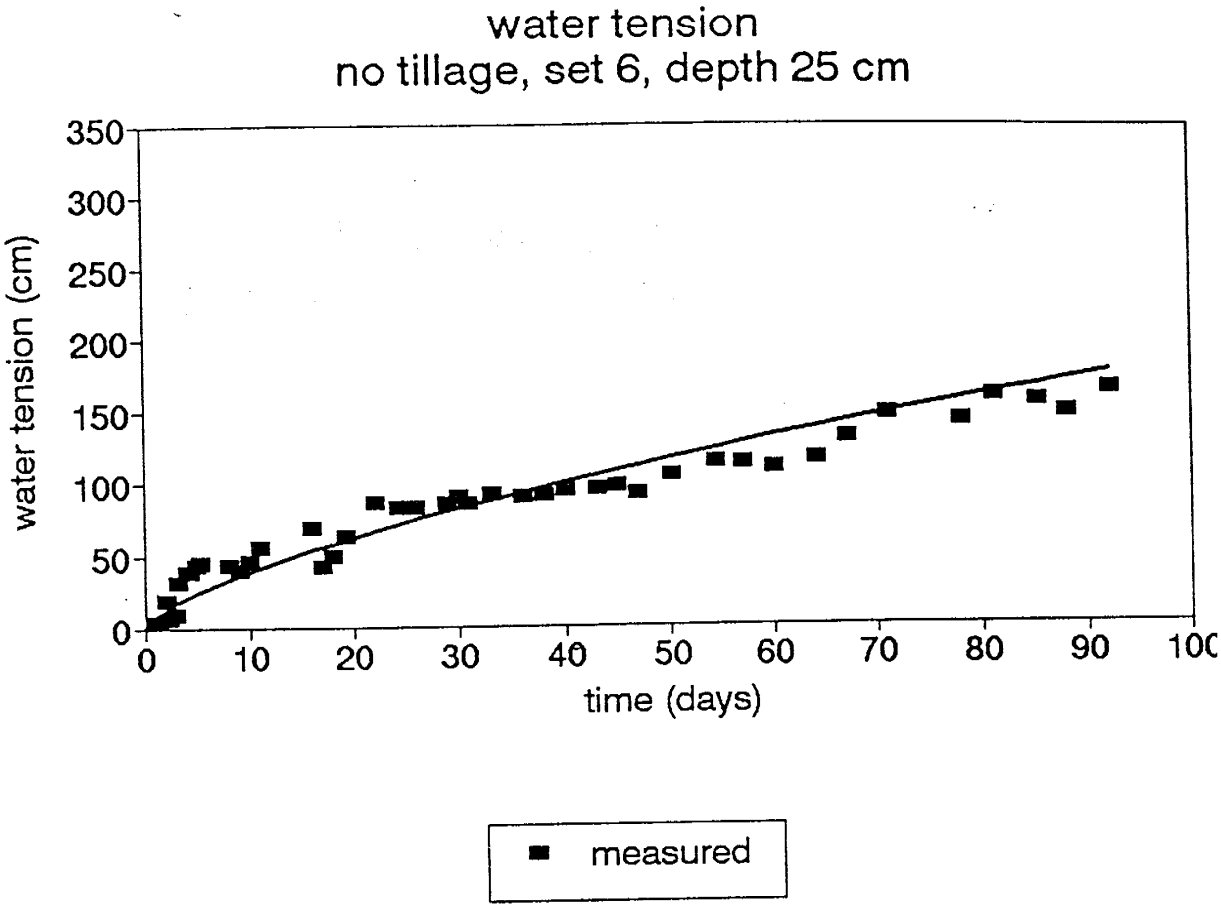

water content
no tillage, set 5, depth 115 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

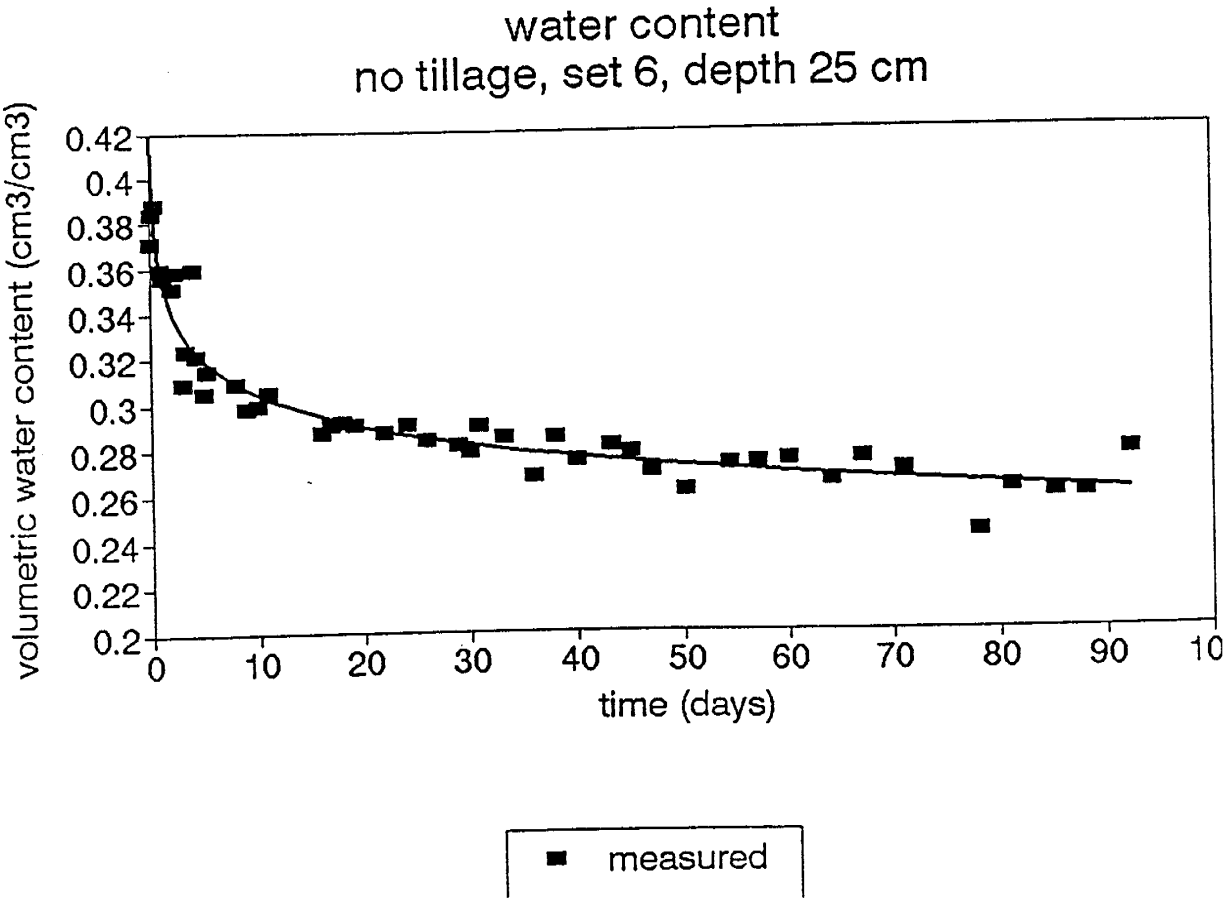

water tension
no tillage, set 5, depth 165 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

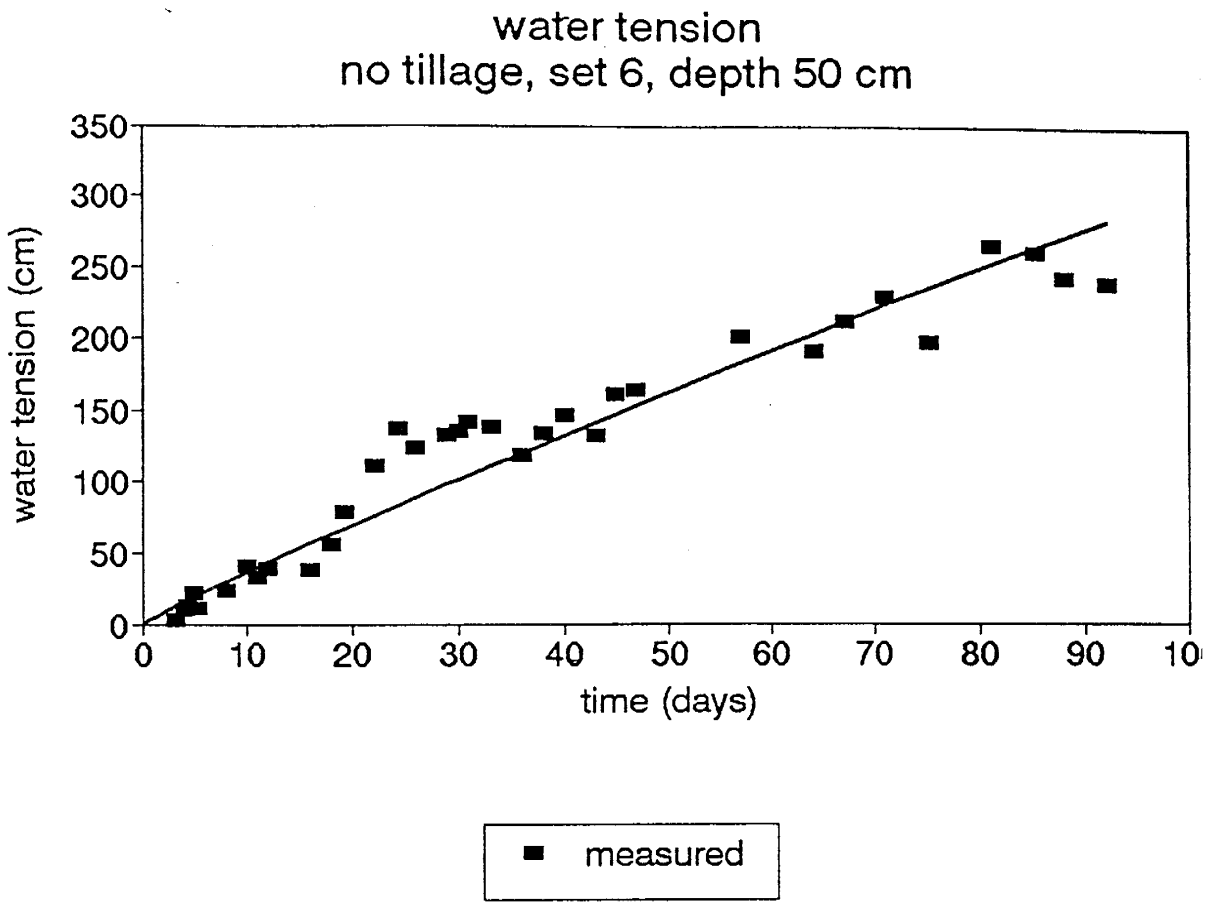

water content
no tillage, set 5, depth 165 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

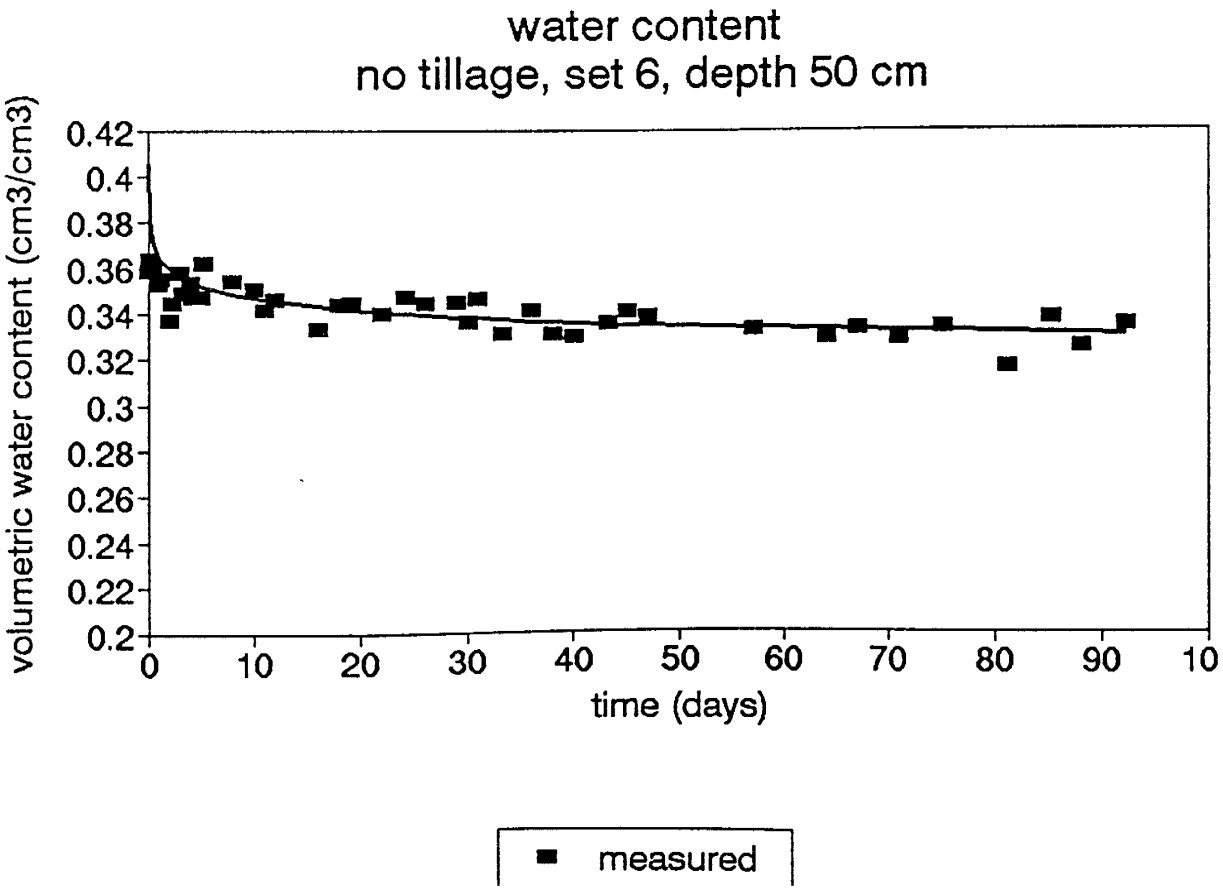

water tension
no tillage, set 5, depth 215 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

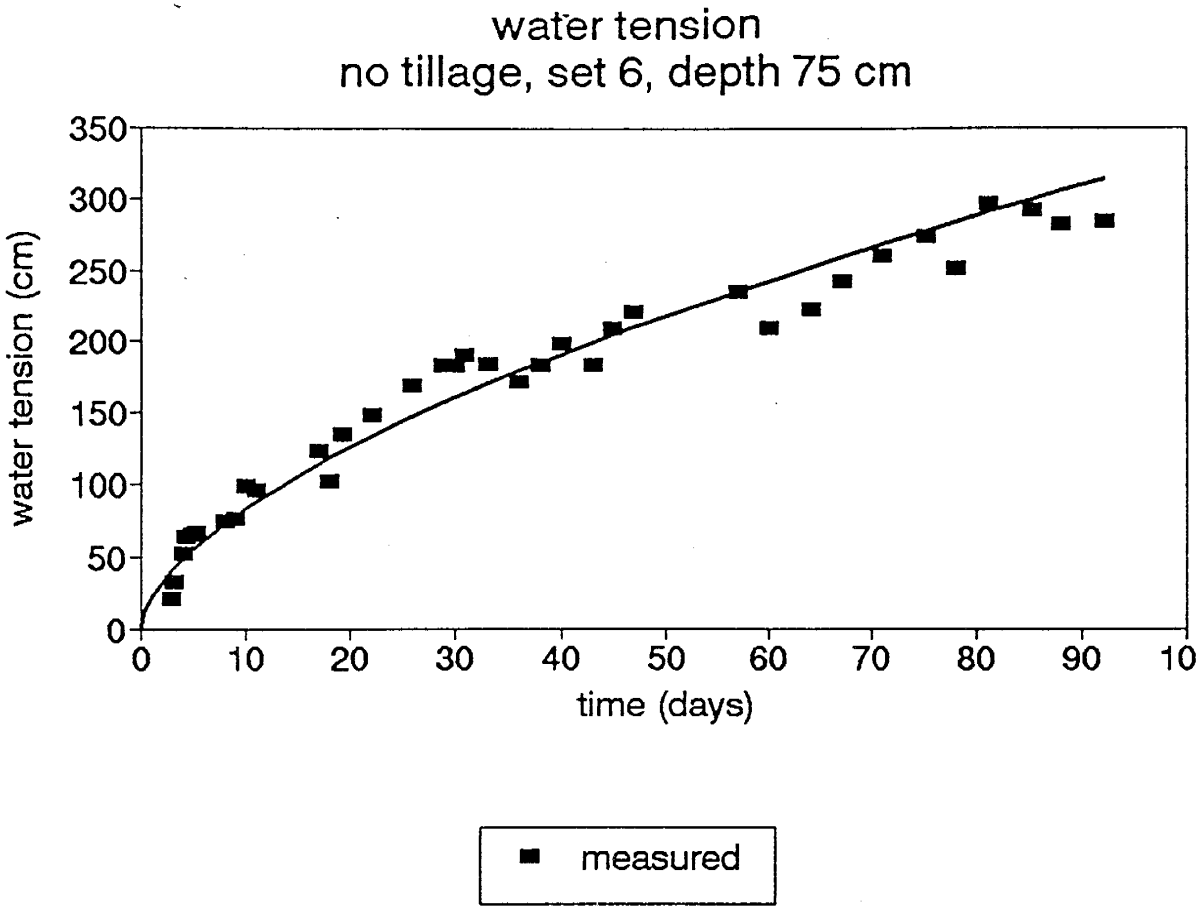

water content
no tillage, set 5, depth 215 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

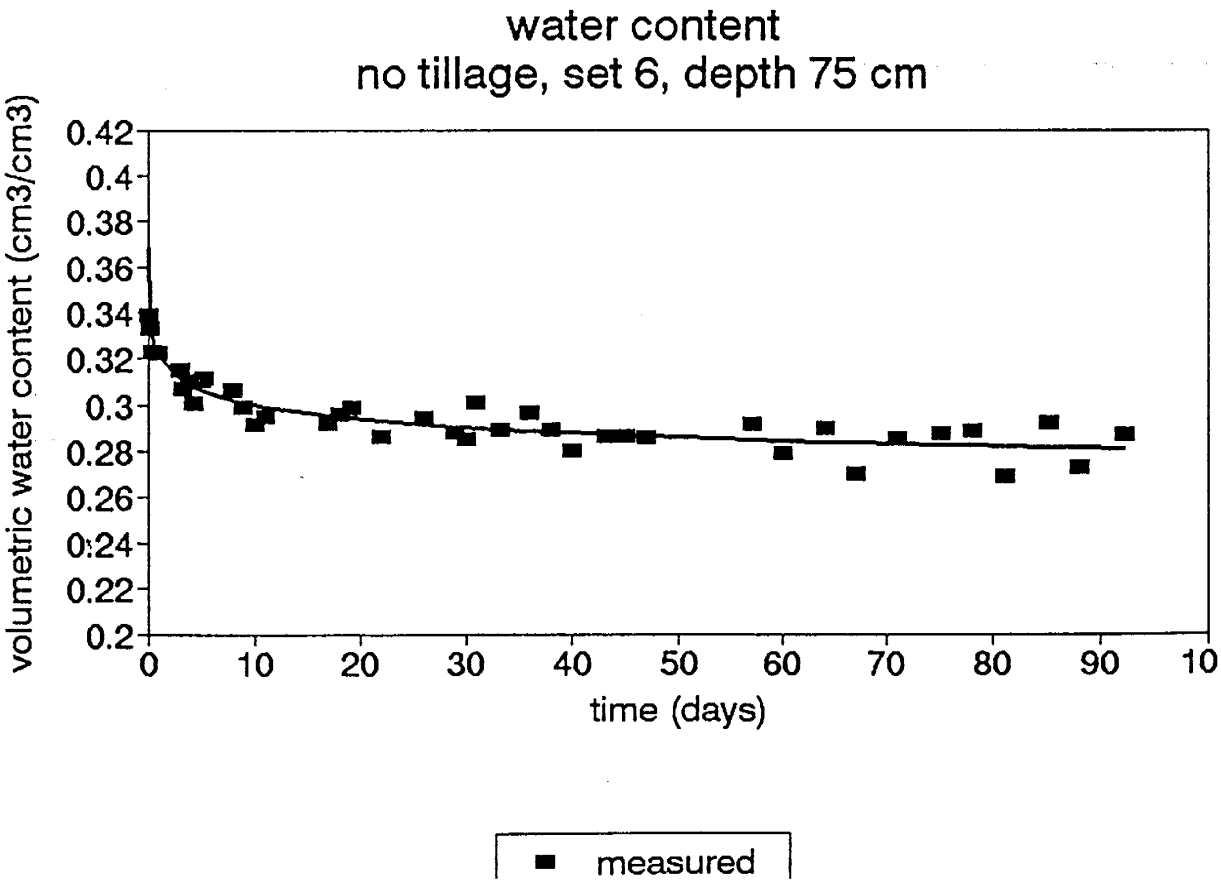

water tension
no tillage, set 6, depth 25 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured

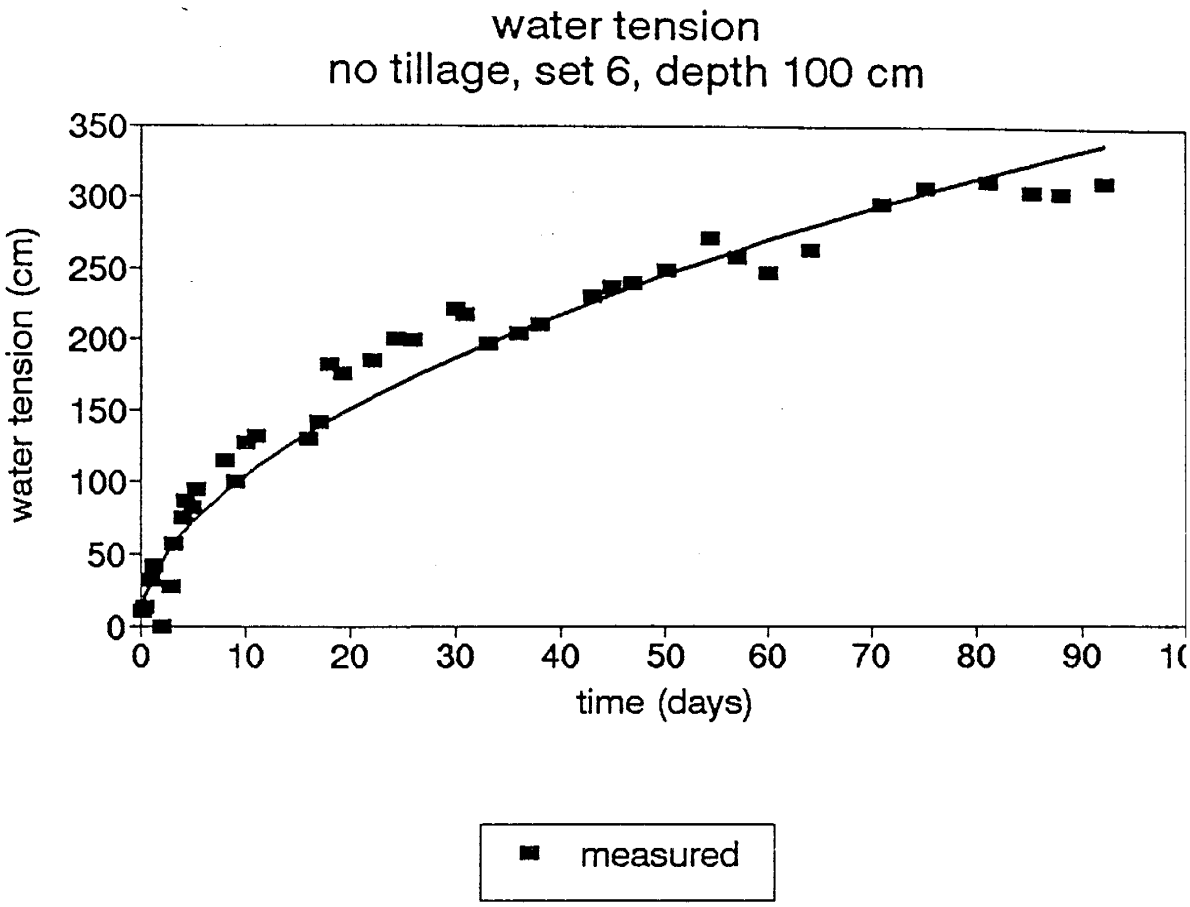

water content
no tillage, set 6, depth 25 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

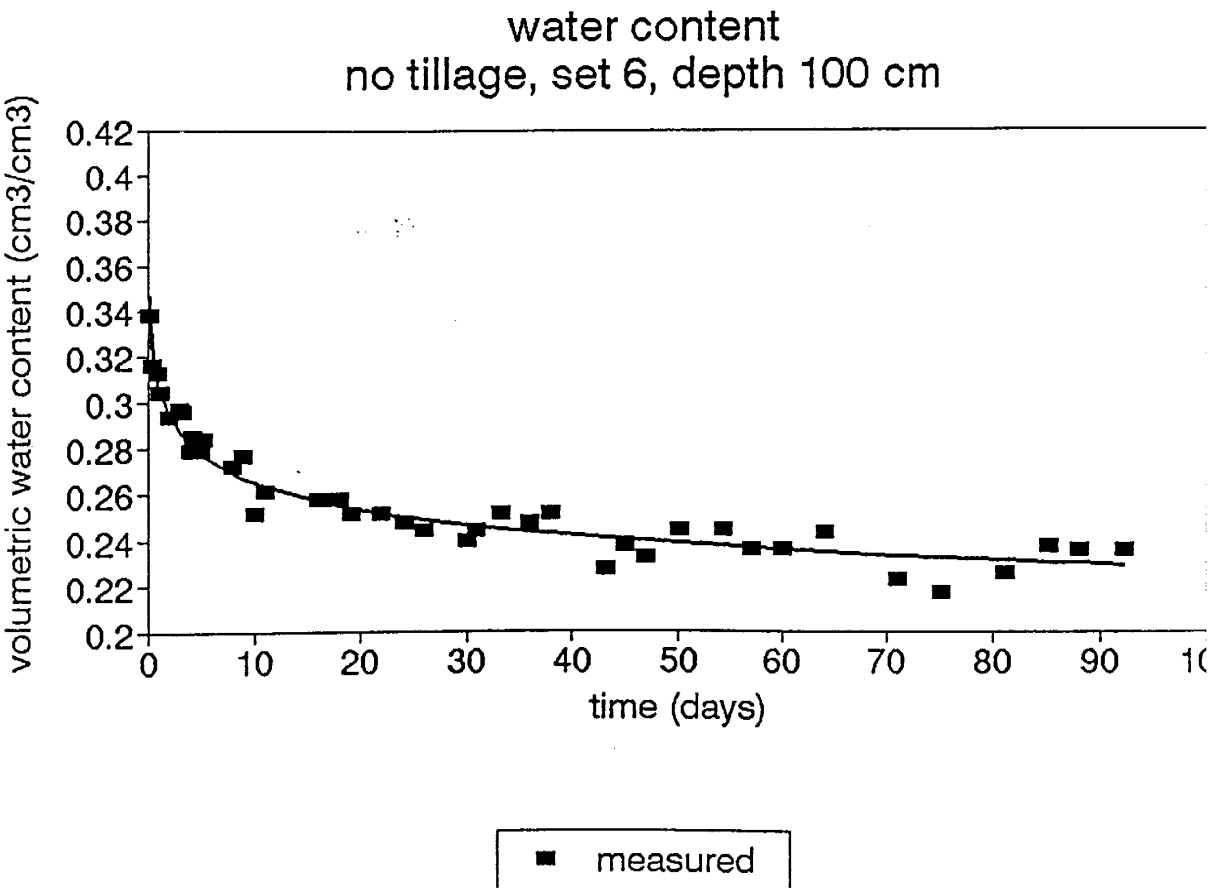

water tension
no tillage, set 6, depth 50 cm
water tension (cm)
time (days)
measured

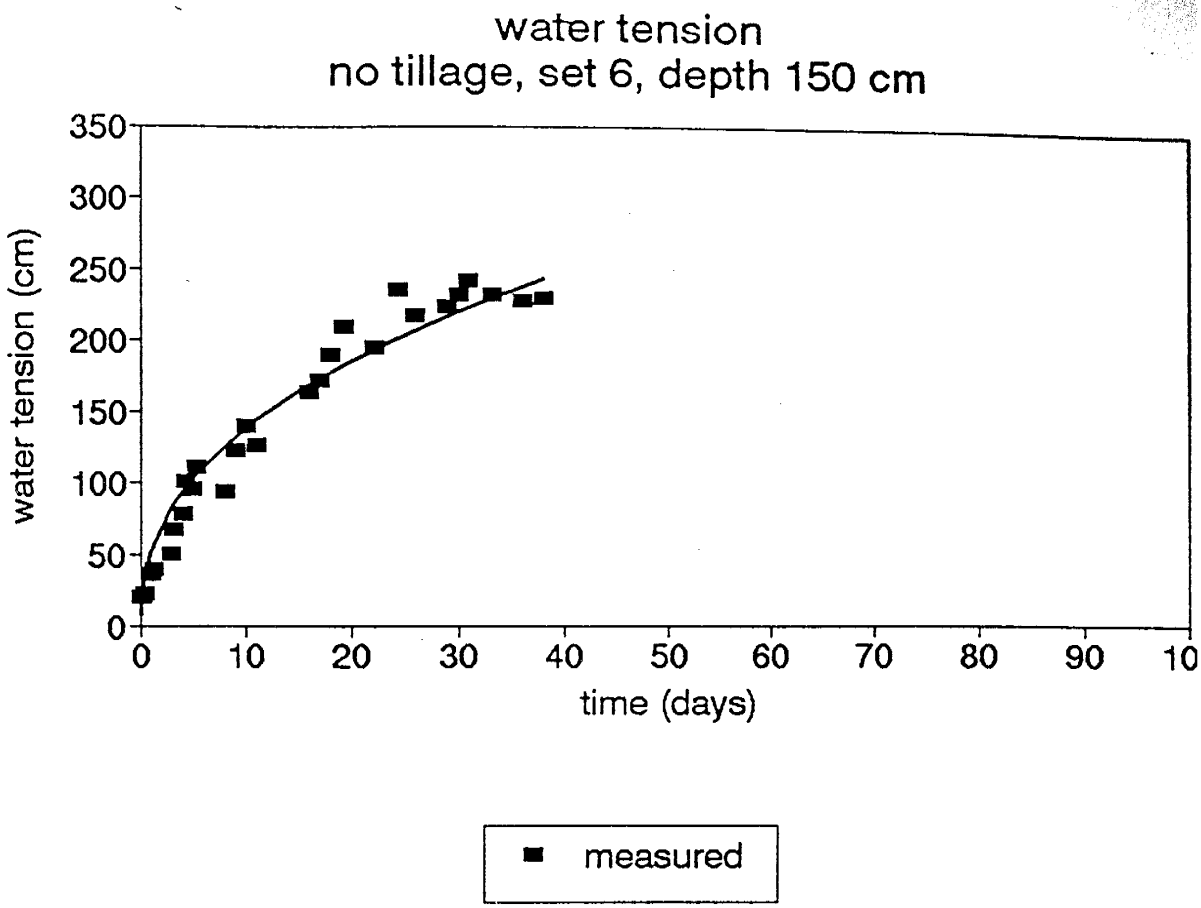

water content
no tillage, set 6, depth 50 cm
volumetric water content (cm3/cm3)
time (days)
measured

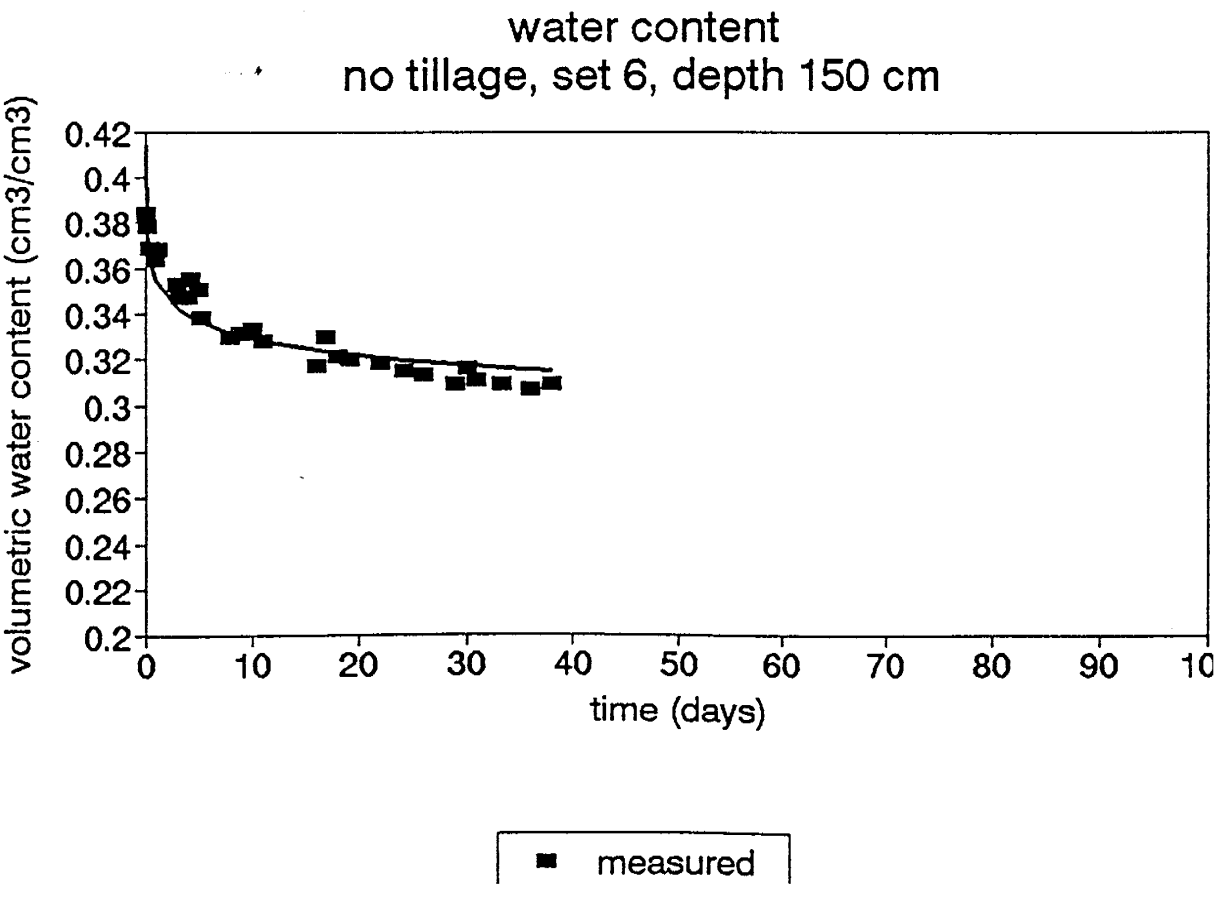

water tension
no tillage, set 6, depth 75 cm
water tension (cm)
time (days)
measured

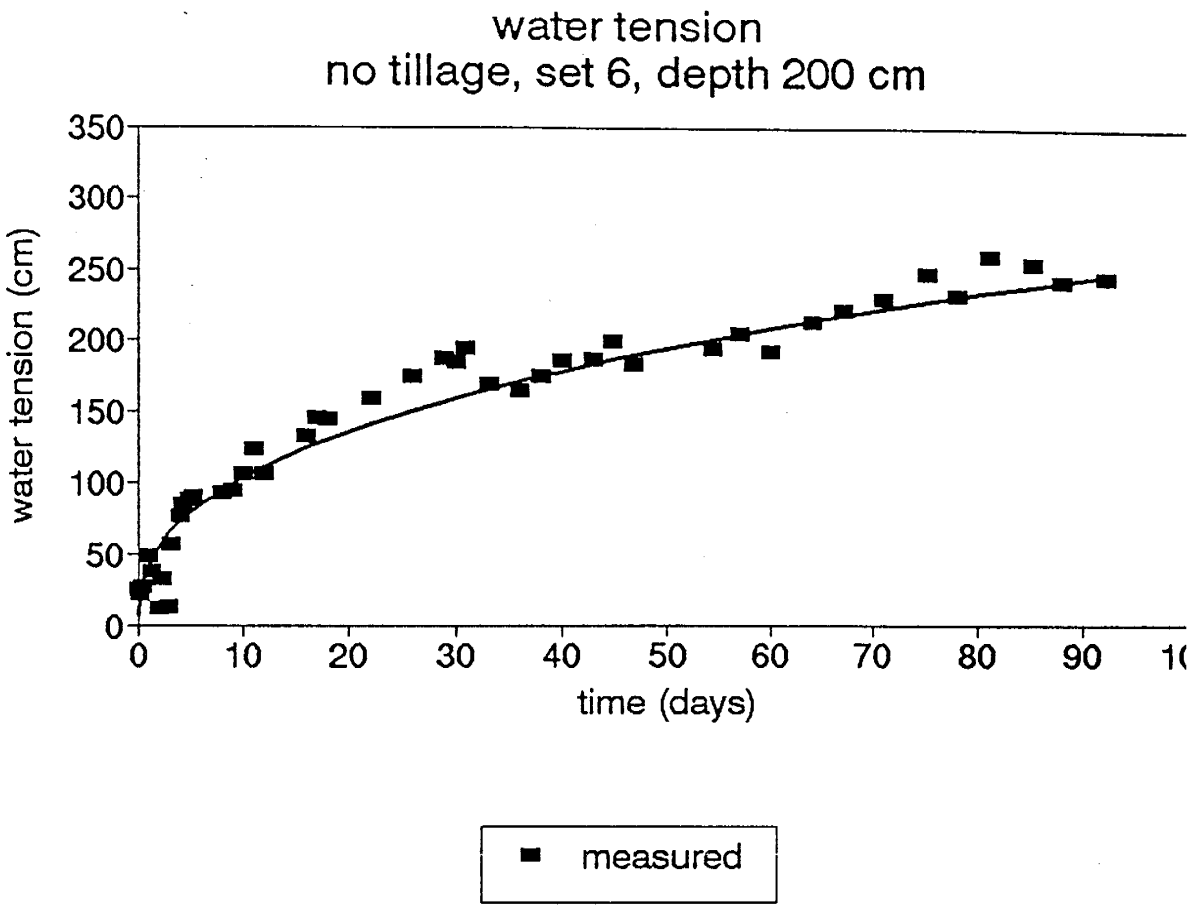

water content
no tillage, set 6, depth 75 cm
volumetric water content (cm3/cm3)
time (days)
measured

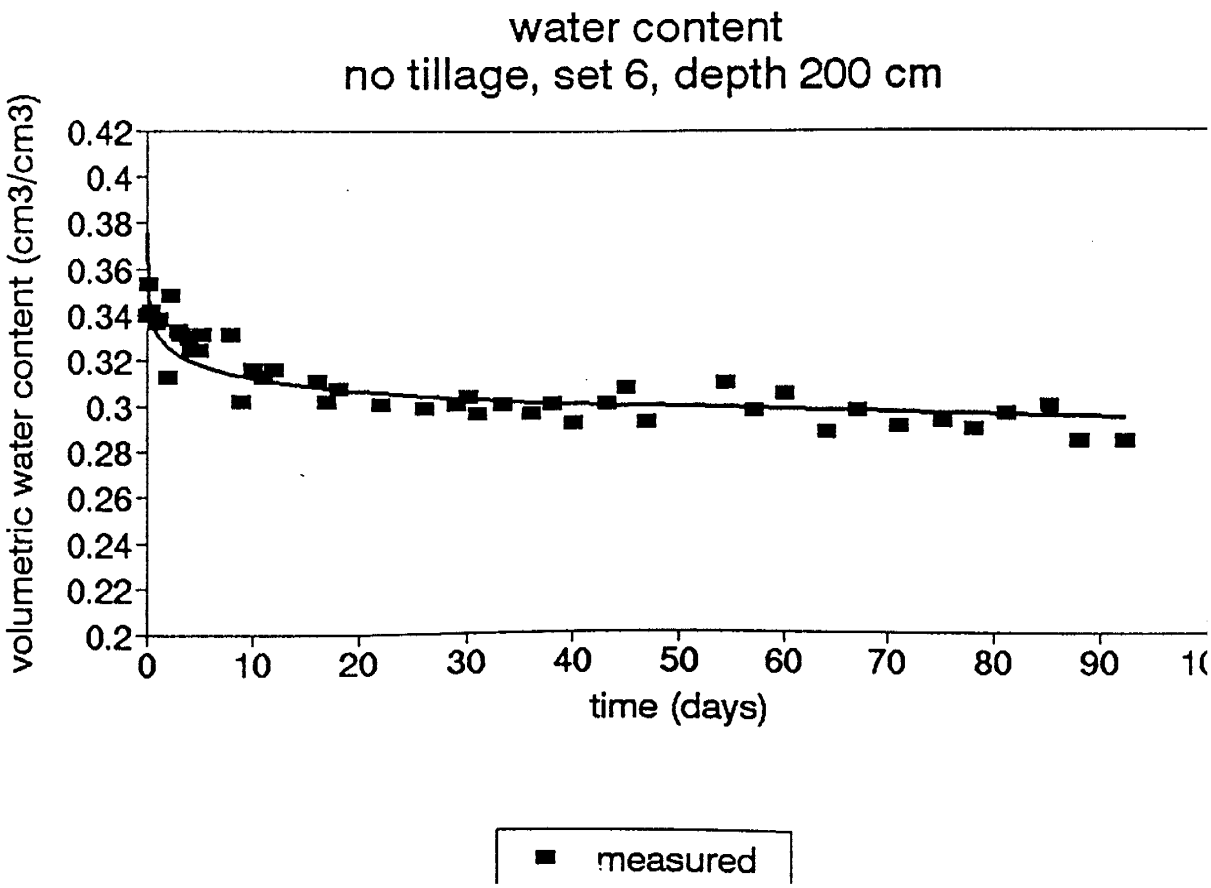

water tension
no tillage, set 6, depth 100 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

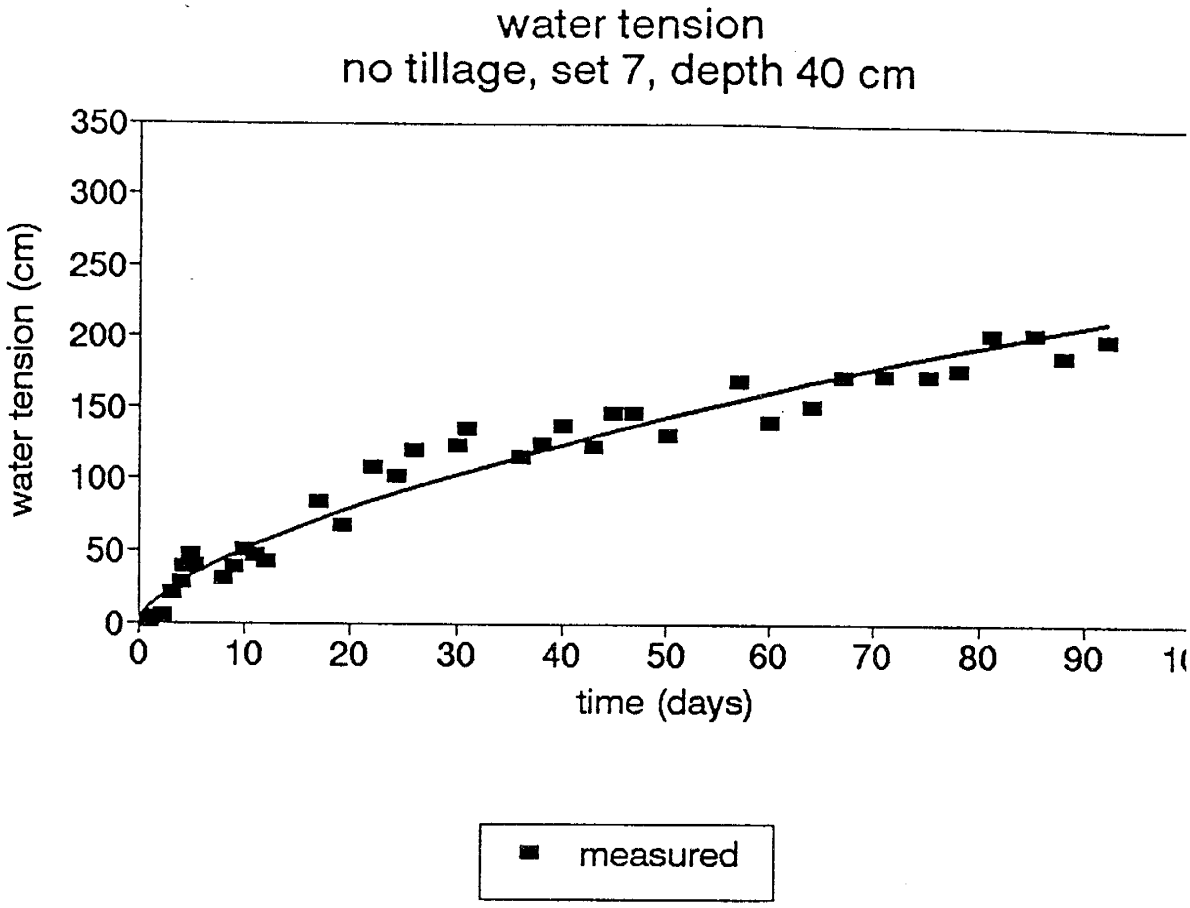

water content
no tillage, set 6, depth 100 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

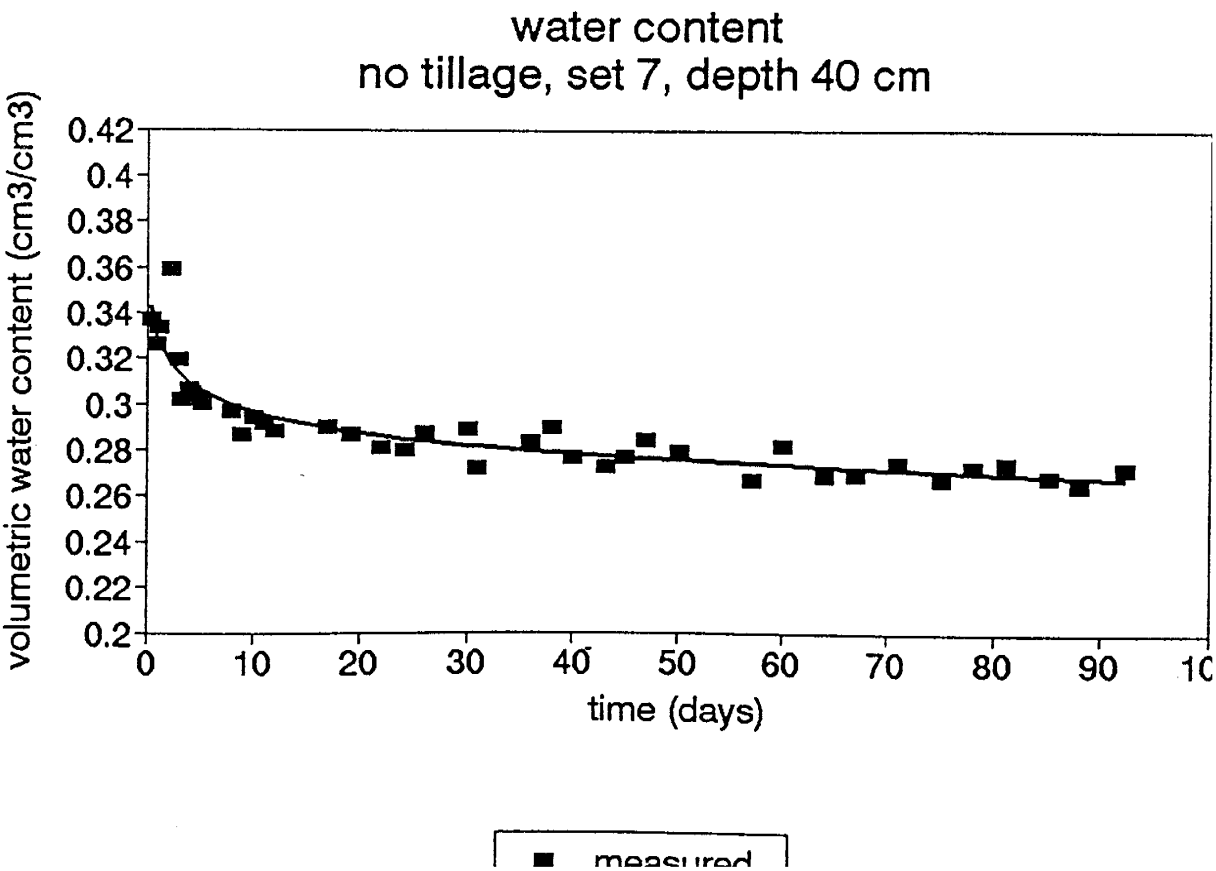

water tension
no tillage, set 6, depth 150 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

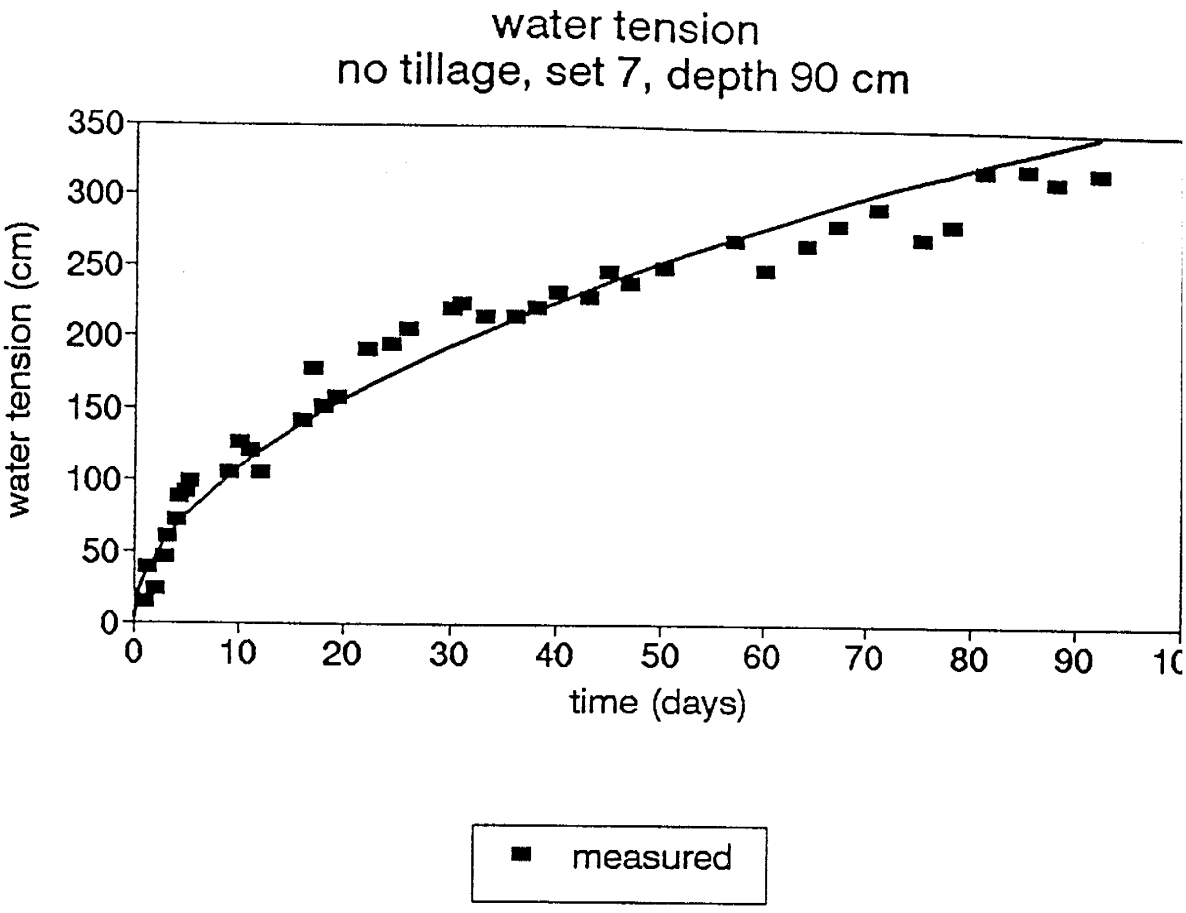

water content
no tillage, set 6, depth 150 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

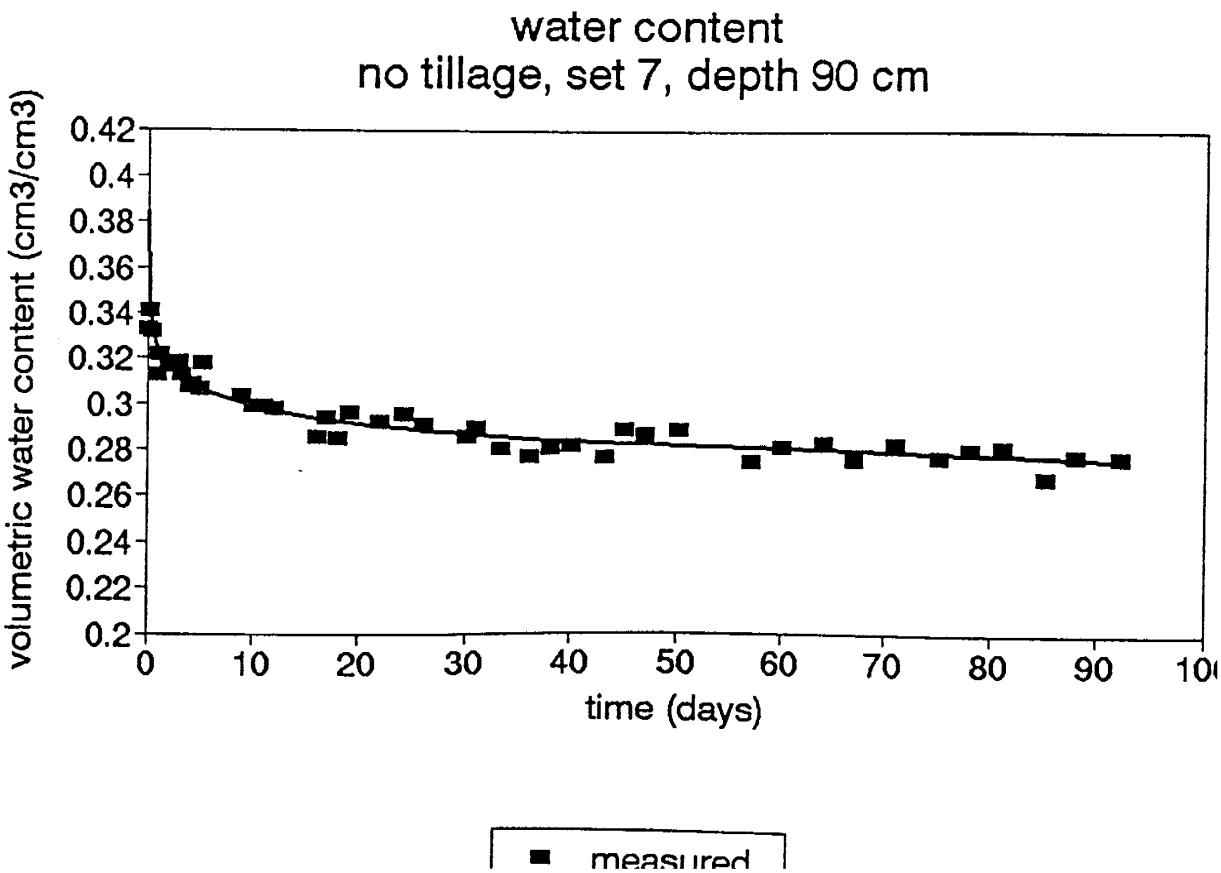

water tension
no tillage, set 6, depth 200 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

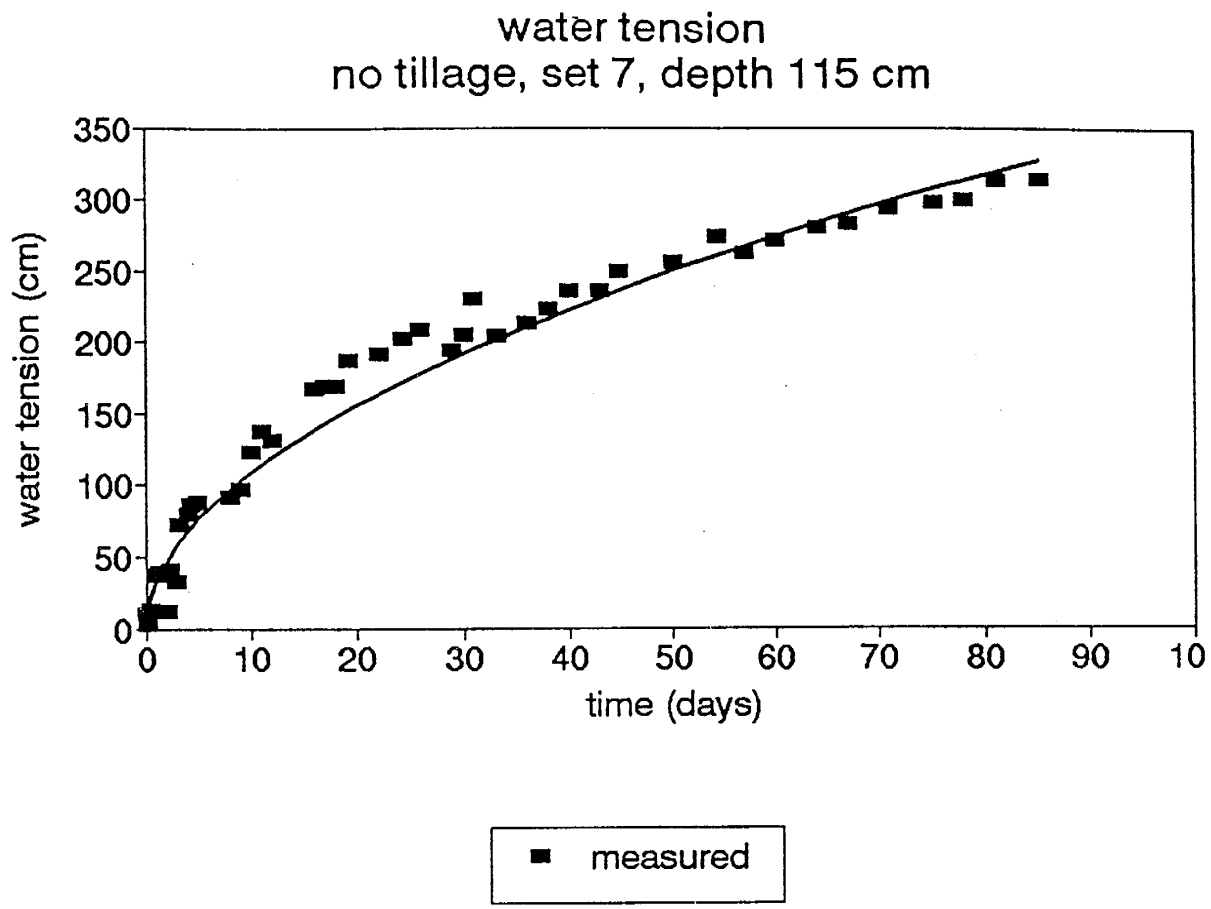

water content
no tillage, set 6, depth 200 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

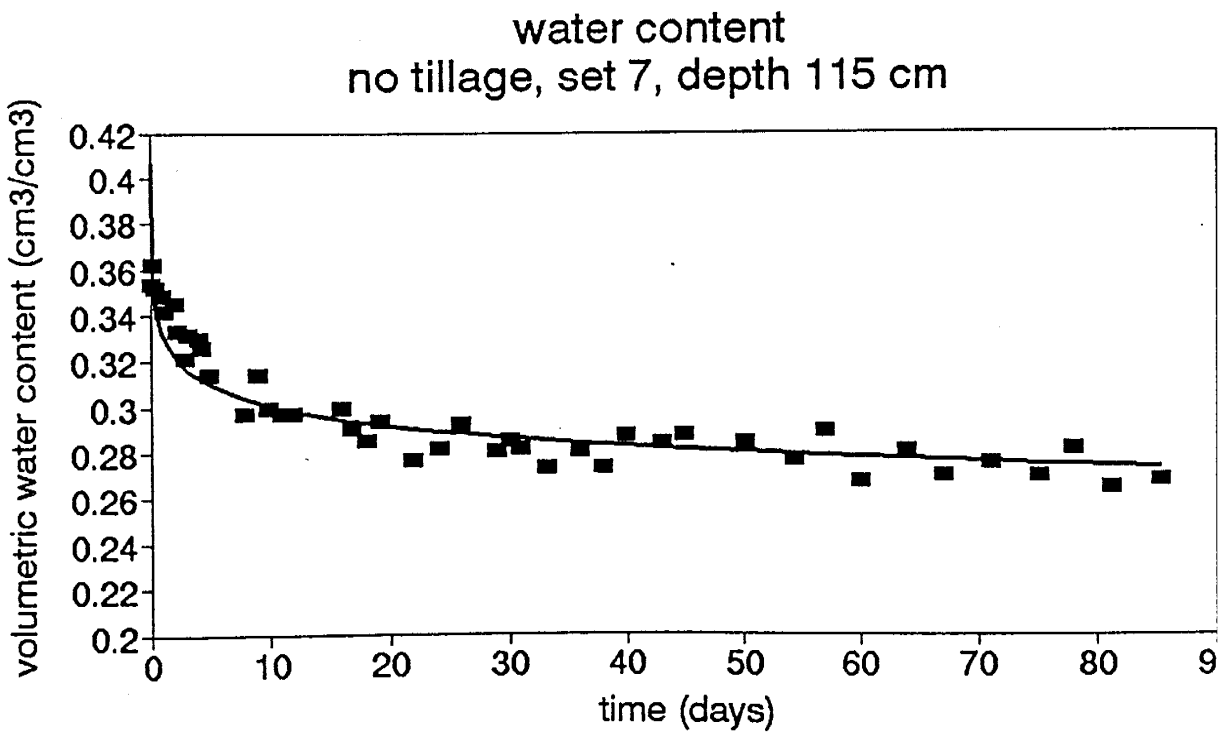

water tension
no tillage, set 7, depth 40 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

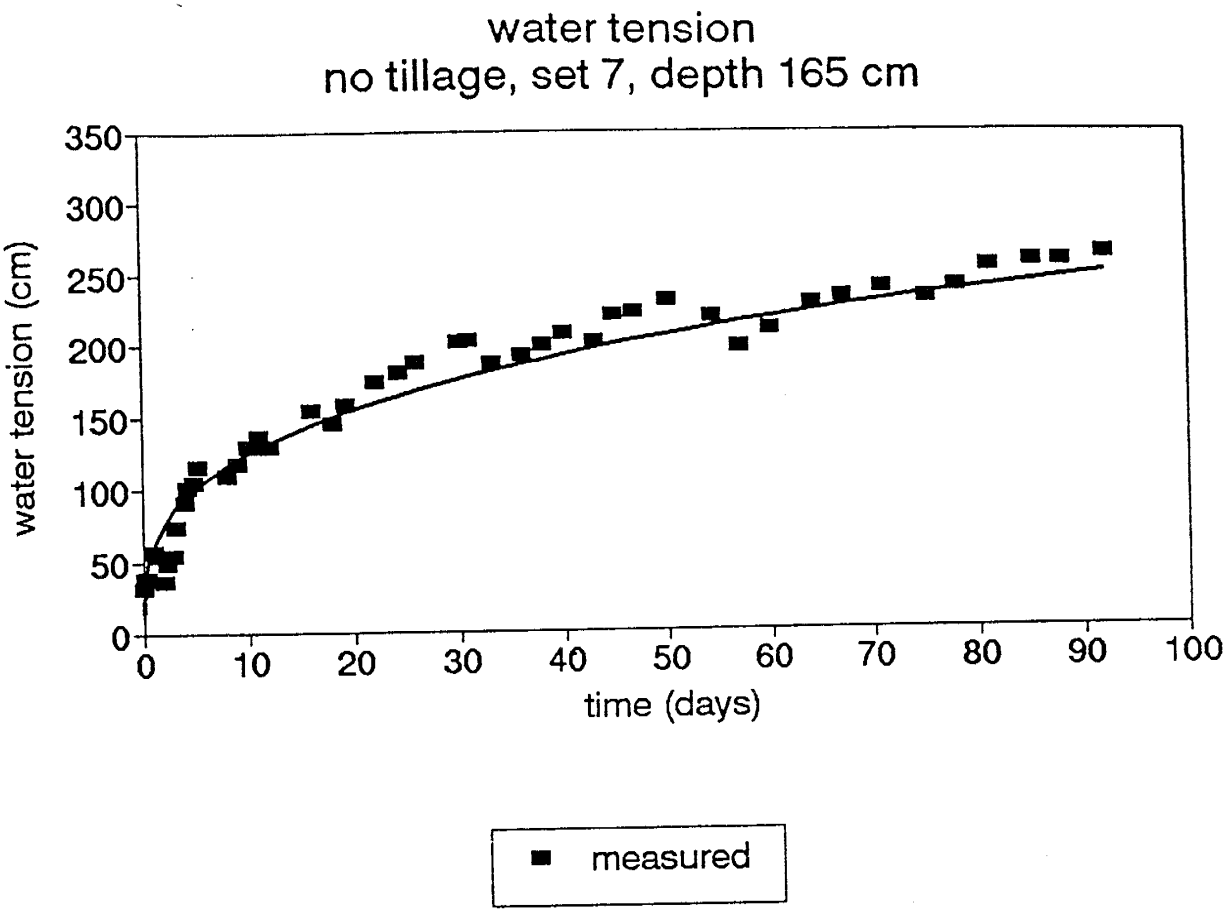

water content
no tillage, set 7, depth 40 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

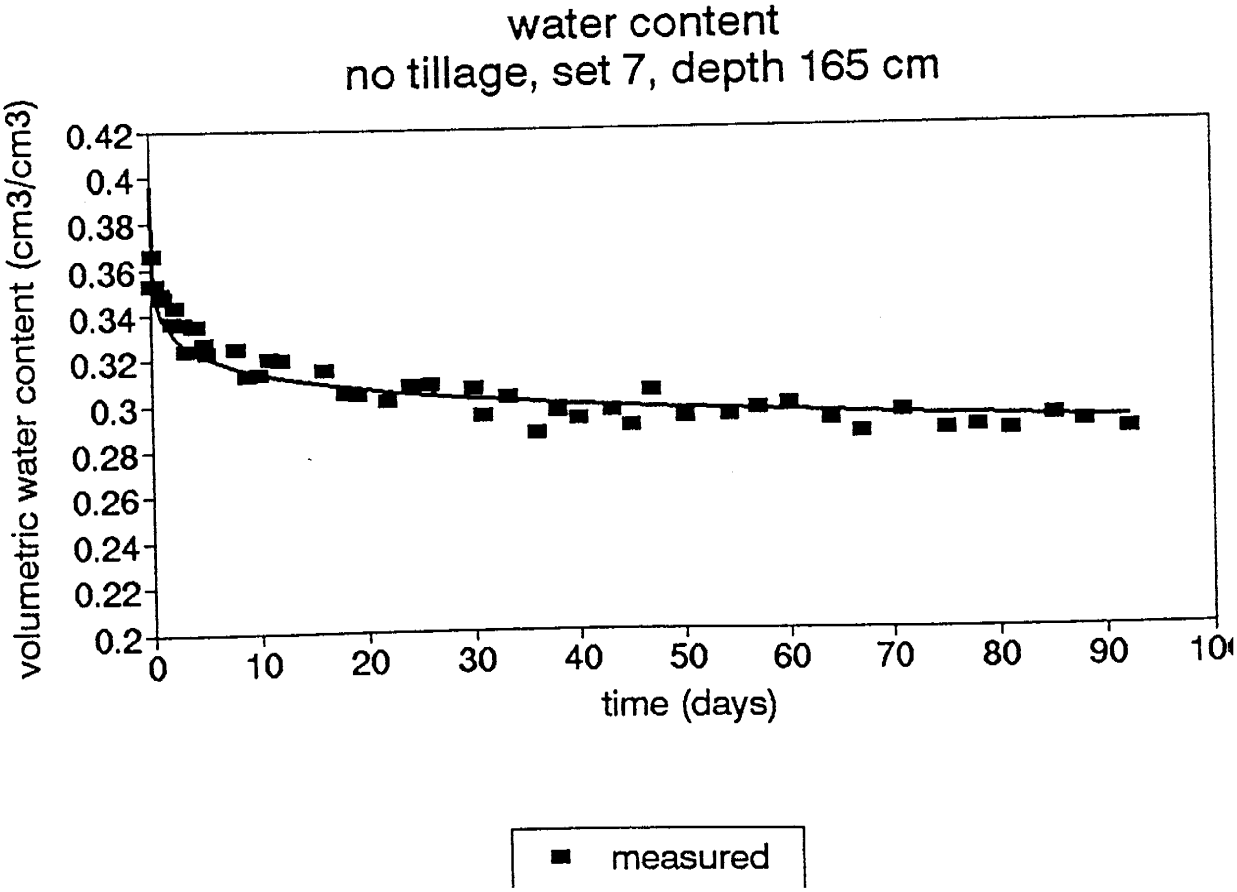

water tension
no tillage, set 7, depth 90 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
time (days)
measured

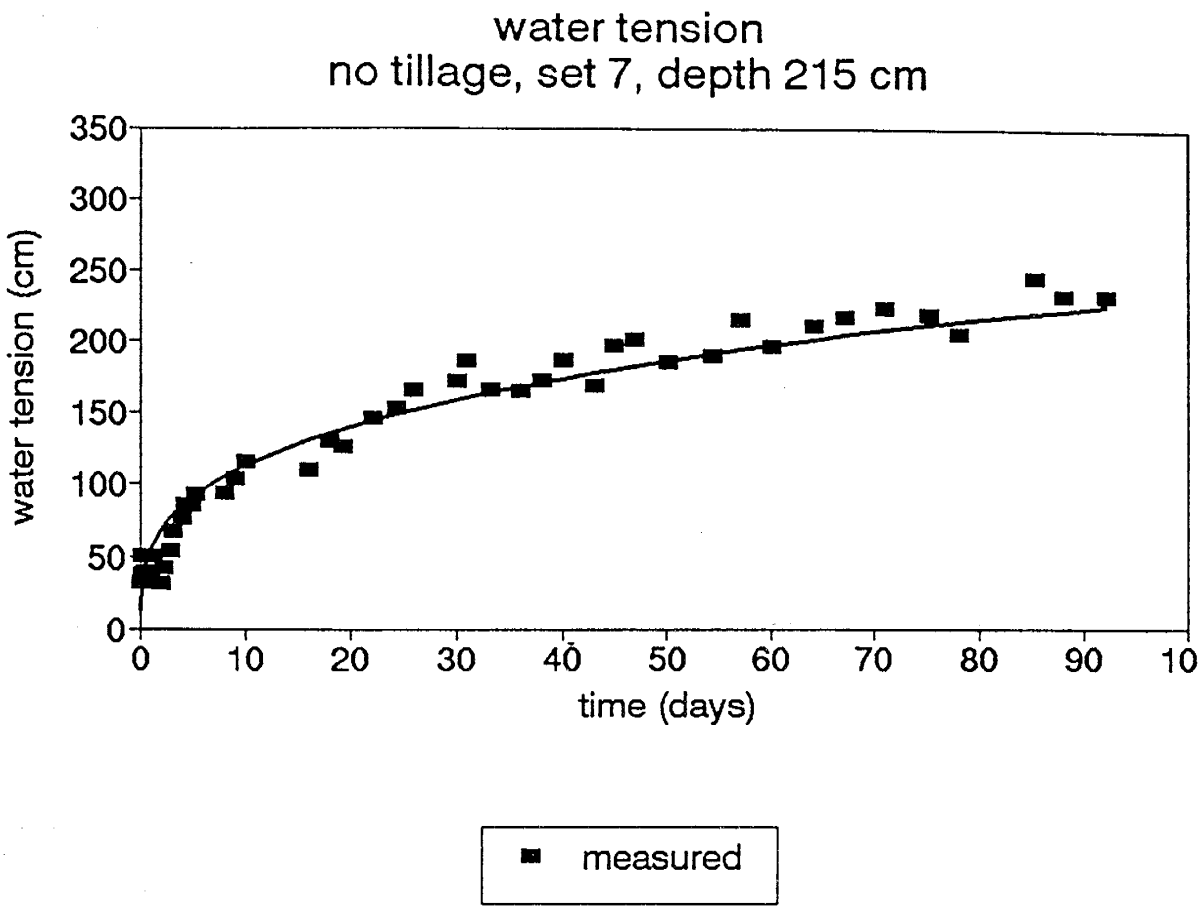

water content
no tillage, set 7, depth 90 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured

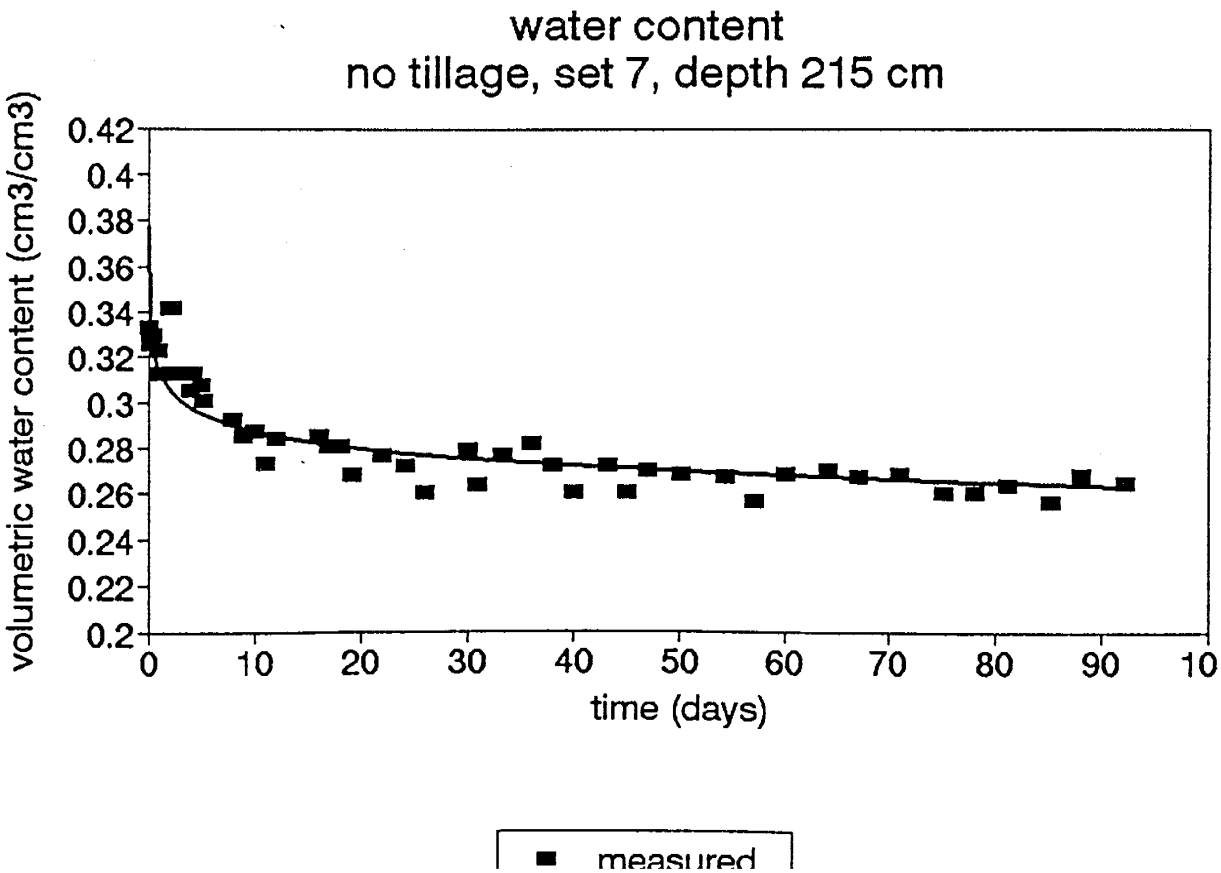

water tension
no tillage, set 7, depth 115 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured


water content
no tillage, set 7, depth 115 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
9
time (days)
measured


water tension
no tillage, set 7, depth 165 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
time (days)
measured


water content
no tillage, set 7, depth 165 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
time (days)
measured


water tension
no tillage, set 7, depth 215 cm
water tension (cm)
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured


water content
no tillage, set 7, depth 215 cm
volumetric water content (cm3/cm3)
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0
10
20
30
40
50
60
70
80
90
10
time (days)
measured

Appendix H: Coefficients of the soil water tension curves.

Clean tillage, set 1, $h = at^b$ (t in days).			
depth (cm)	**a**	**b**	**r^2**
40	-24.5132	0.5232	0.917
65	-50.7809	0.3727	0.977
90	-63.6209	0.3185	0.937
115	-46.4359	0.4082	0.982
165	-40.9642	0.4228	0.979

Clean tillage, set 2, $h = at^b$ (t in days).			
depth (cm)	**a**	**b**	**r^2**
25	-14.6757	0.4729	0.861
50	-18.4969	0.6232	0.824
75	-52.5030	0.3852	0.978
100	-42.2880	0.4396	0.894
150	-41.8502	0.4097	0.910

Clean tillage, set 3, $h = at^b$ (t in days).			
depth (cm)	**a**	**b**	**r^2**
40	-18.8967	0.5803	0.893
65	-30.5070	0.5082	0.963
90	-57.3635	0.3492	0.934
115	-47.6480	0.3871	0.906
165	-58.6295	0.3142	0.944

Clean tillage, set 4, $h = at^b$ (t in days).			
depth (cm)	**a**	**b**	**r^2**
25	-15.1183	0.4890	0.924
50	-22.9260	0.5522	0.955
75	-36.5056	0.4763	0.966
100	-46.4471	0.3959	0.978
150	-43.8769	0.3919	0.864

Clean tillage, set 5, $h = at^b$ (t in days).			
depth (cm)	**a**	**b**	r^2
40	-16.7164	0.6053	0.922
65	-38.9685	0.4460	0.958
90	-47.5969	0.4021	0.910
115	-32.8776	0.4962	0.955
165	-51.4581	0.3506	0.917

Clean tillage, set 6, $h = at^b$ (t in days).			
depth (cm)	**a**	**b**	r^2
25	-11.5167	0.5549	0.898
50	- 6.3606	0.8661	0.993
75	-38.5531	0.4564	0.927
100	-36.8396	0.4717	0.929
150	-	-	-

Clean tillage, set 7, $h = at^b$ (t in days).			
depth (cm)	**a**	**b**	r^2
40	-14.2699	0.6220	0.893
65	-25.4177	0.5383	0.982
90	-57.4945	0.3368	0.951
115	-46.4761	0.3990	0.985
165	-	-	-

No tillage, set 1, $h = at^b$ (t in days).			
depth (cm)	a	b	r^2
40	6.5751	0.7463	0.868
65	12.0476	0.7074	0.968
90	36.1410	0.4900	0.941
115	51.3098	0.4076	0.943
165	50.7575	0.3714	0.877
215	59.5662	0.2879	0.739

No tillage, set 2, $h = at^b$ (t in days).			
depth (cm)	a	b	r^2
25	7.7571	0.6743	0.986
50	4.2131	0.9283	0.929
75	13.9605	0.6795	0.959
100	46.3340	0.4424	0.924
150	63.4016	0.3376	0.840
200	71.1869	0.2676	0.859

No tillage, set 3, $h = at^b$ (t in days).			
depth (cm)	a	b	r^2
40	8.3157	0.7443	0.882
65	15.4668	0.6583	0.969
90	20.1930	0.6334	0.892
115	49.3060	0.4139	0.909
165	59.5251	0.3206	0.820
215	56.8853	0.3037	0.855

No tillage, set 4, $h = at^b$ (t in days).			
depth (cm)	a	b	r^2
25	9.5521	0.6161	0.887
50	5.2578	0.8919	0.955
75	12.1619	0.7153	0.947
100	41.1055	0.4608	0.904
150	56.0919	0.3543	0.905
200	67.9986	0.2890	0.911

No tillage, set 5, $h = at^b$ (t in days).			
depth (cm)	a	b	r^2
40	8.5526	0.7141	0.959
65	18.4629	0.6281	0.944
90	29.3630	0.5245	0.949
115	29.8058	0.5466	0.944
165	51.9039	0.3701	0.947
215	54.7520	0.3143	0.867

No tillage, set 6, $h = at^b$ (t in days).			
depth (cm)	a	b	r^2
25	8.3243	0.6738	0.867
50	4.4937	0.9153	0.965
75	21.3649	0.5945	0.940
100	31.0027	0.5277	0.962
150	52.6260	0.4197	0.911
200	42.4913	0.3871	0.808

No tillage, set 7, $h = at^b$ (t in days).			
depth (cm)	a	b	r^2
40	11.6708	0.6406	0.979
65	-	-	-
90	32.9231	0.5208	0.923
115	33.1513	0.5152	0.890
165	61.3479	0.3093	0.889
215	55.6032	0.3085	0.875

Appendix I: Coefficients of the volumetric water content curves.

Clean tillage, set 1, $\theta = ct^d$ (t in days).			
depth (cm)	**a**	**b**	r^2
40	0.3356	-0.04355	0.942
65	0.3302	-0.02357	0.877
90	0.3051	-0.04132	0.953
115	0.2980	-0.06722	0.929
165	0.3183	-0.06086	0.970

Clean tillage, set 2, $\theta = ct^d$ (t in days).			
depth (cm)	**a**	**b**	r^2
25	0.3041	-0.06853	0.978
50	0.3409	-0.01794	0.853
75	0.3138	-0.03277	0.947
100	0.2931	-0.06577	0.931
150	0.3138	-0.07795	0.950

Clean tillage, set 3, $\theta = ct^d$ (t in days).			
depth (cm)	**a**	**b**	r^2
40	0.3298	-0.01740	0.900
65	0.3178	-0.01738	0.830
90	0.2986	-0.03549	0.900
115	0.2854	-0.06357	0.921
165	0.2923	-0.06651	0.909

Clean tillage, set 4, $\theta = ct^d$ (t in days).			
depth (cm)	**a**	**b**	r^2
25	0.3461	-0.02355	0.892
50	0.3344	-0.02683	0.929
75	0.3015	-0.04524	0.961
100	0.2808	-0.06626	0.936
150	0.3221	-0.03479	0.918

Clean tillage, set 5, $\theta = ct^d$ (t in days).			
depth (cm)	**a**	**b**	**r^2**
40	0.3388	-0.03346	0.899
65	0.3267	-0.02274	0.871
90	0.2975	-0.03113	0.903
115	0.2815	-0.05428	0.867
165	0.2978	-0.06721	0.919

Clean tillage, set 6, $\theta = ct^d$ (t in days).			
depth (cm)	**a**	**b**	**r^2**
25	0.3444	-0.02522	0.884
50	0.3365	-0.01647	0.857
75	0.3155	-0.03607	0.934
100	0.2812	-0.07627	0.953
150	-	-	-

Clean tillage, set 7, $\theta = ct^d$ (t in days).			
depth (cm)	**a**	**b**	**r^2**
40	0.3397	-0.01394	0.845
65	0.3264	-0.02212	0.880
90	0.3010	-0.03551	0.916
115	0.2826	-0.05784	0.900
165	-	-	-

No tillage, set 1, $\theta = ct^d$ (t in days).			
depth (cm)	a	b	r^2
40	0.3463	-0.02843	0.857
65	0.3357	-0.02465	0.899
90	0.3159	-0.04457	0.925
115	0.3300	-0.07026	0.939
165	0.3228	-0.04093	0.906
215	0.3014	-0.02456	0.754

No tillage, set 2, $\theta = ct^d$ (t in days).			
depth (cm)	a	b	r^2
25	0.3705	-0.07626	0.943
50	0.3696	-0.02575	0.869
75	0.3274	-0.03090	0.815
100	0.3021	-0.03319	0.786
150	0.3303	-0.02687	0.789
200	0.3455	-0.02373	0.655

No tillage, set 3, $\theta = ct^d$ (t in days).			
depth (cm)	a	b	r^2
40	0.3564	-0.03086	0.866
65	0.3520	-0.02126	0.722
90	0.3237	-0.03646	0.809
115	0.2987	-0.05188	0.831
165	0.2564	-0.04377	0.838
215	0.2998	-0.04067	0.782

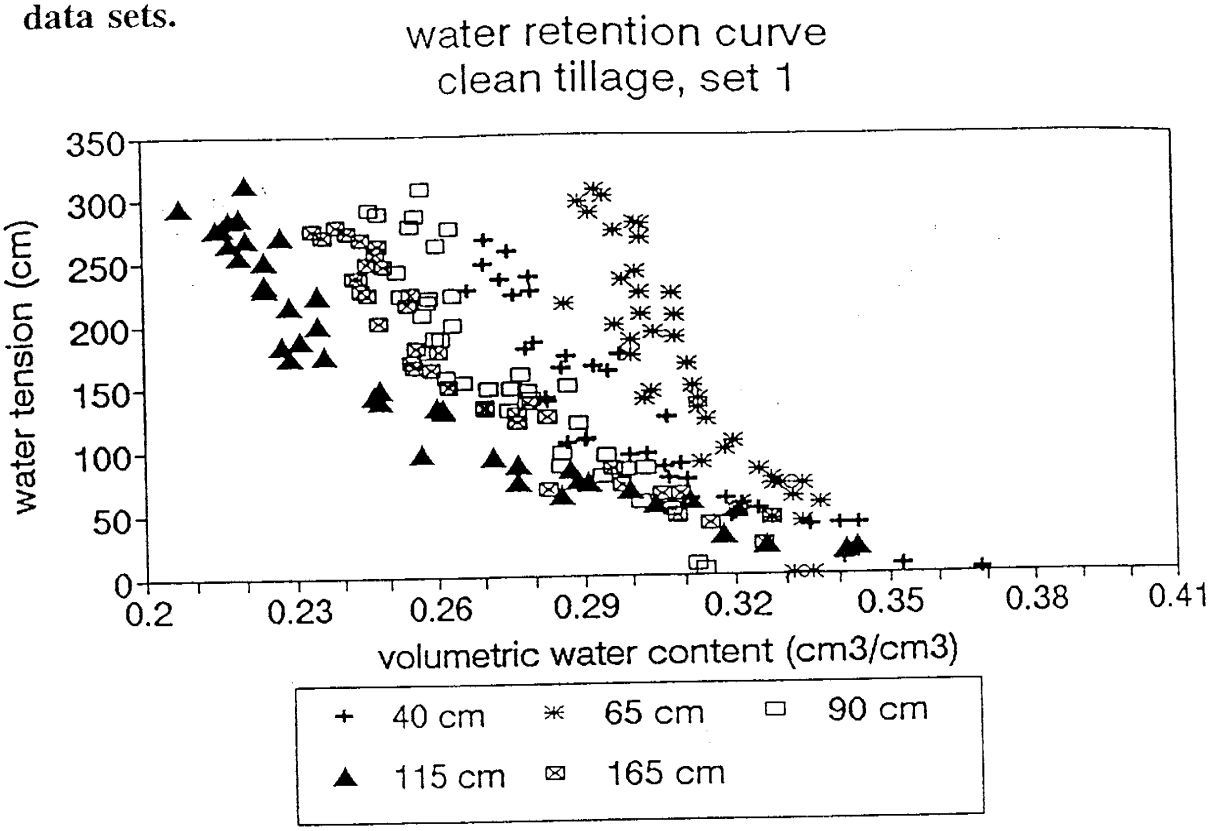
No tillage, set 4, $\theta = ct^d$ (t in days).			
depth (cm)	a	b	r^2
25	0.3501	-0.08545	0.973
50	0.3664	-0.02296	0.781
75	0.3378	-0.03297	0.861
100	0.2950	-0.03385	0.810
150	0.2365	-0.03138	0.854
200	0.2801	-0.04822	0.846

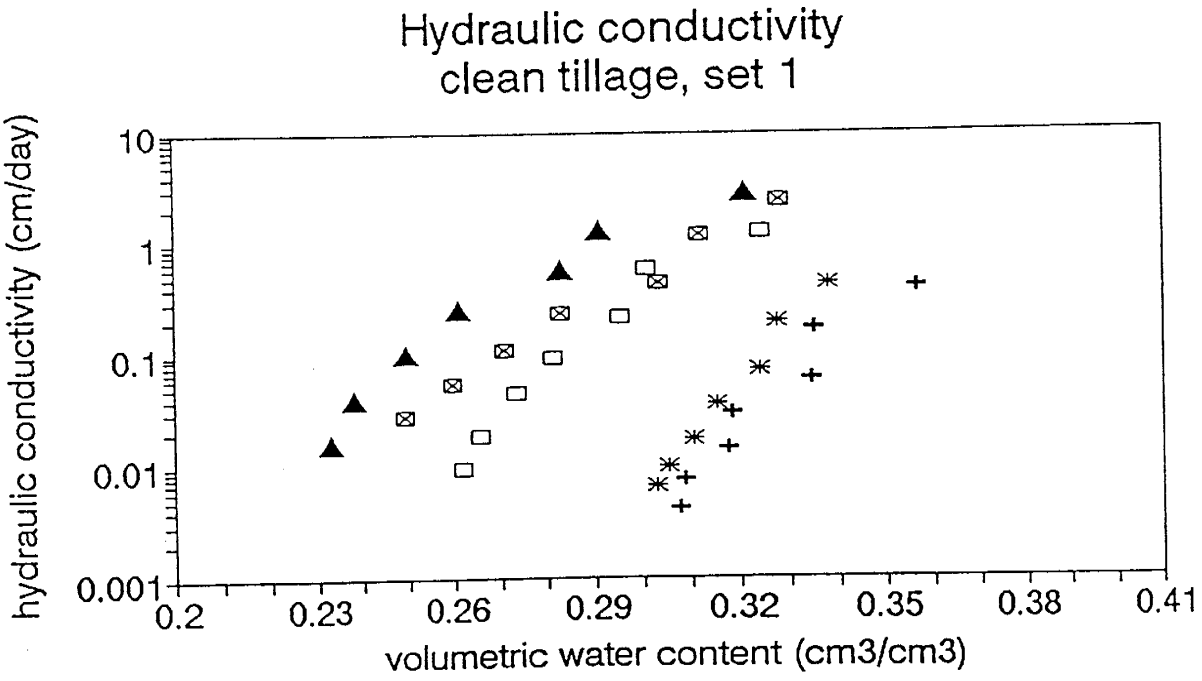
No tillage, set 5, $\theta = ct^d$ (t in days).			
depth (cm)	a	b	r^2
40	0.3615	-0.01944	0.628
65	0.3321	-0.01501	0.757
90	0.3101	-0.04104	0.914
115	0.2936	-0.05179	0.849
165	0.2839	-0.04374	0.801
215	0.3214	-0.02175	0.691

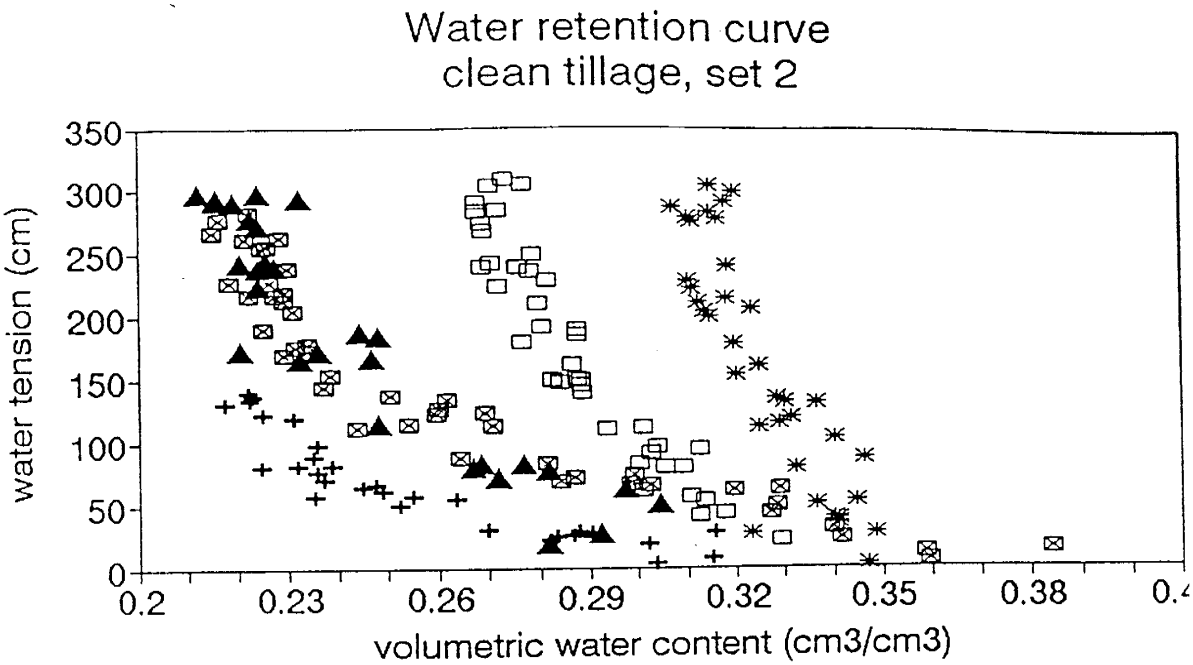
No tillage, set 6, $\theta = ct^d$ (t in days).			
depth (cm)	a	b	r^2
25	0.3568	-0.06909	0.912
50	0.3654	-0.02270	0.630
75	0.3214	-0.02949	0.722
100	0.3086	-0.06568	0.932
150	0.3555	-0.03317	0.854
200	0.3322	-0.02677	0.746

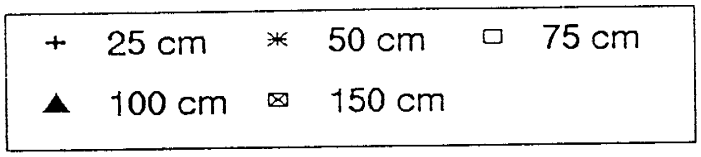
No tillage, set 7, $\theta = ct^n$ (t in days).			
depth (cm)	a	b	r^2
40	0.3303	-0.04655	0.855
65	-	-	-
90	0.3251	-0.03645	0.882
115	0.3324	-0.04374	0.843
165	0.3396	-0.03376	0.849
215	0.3145	-0.03938	0.792

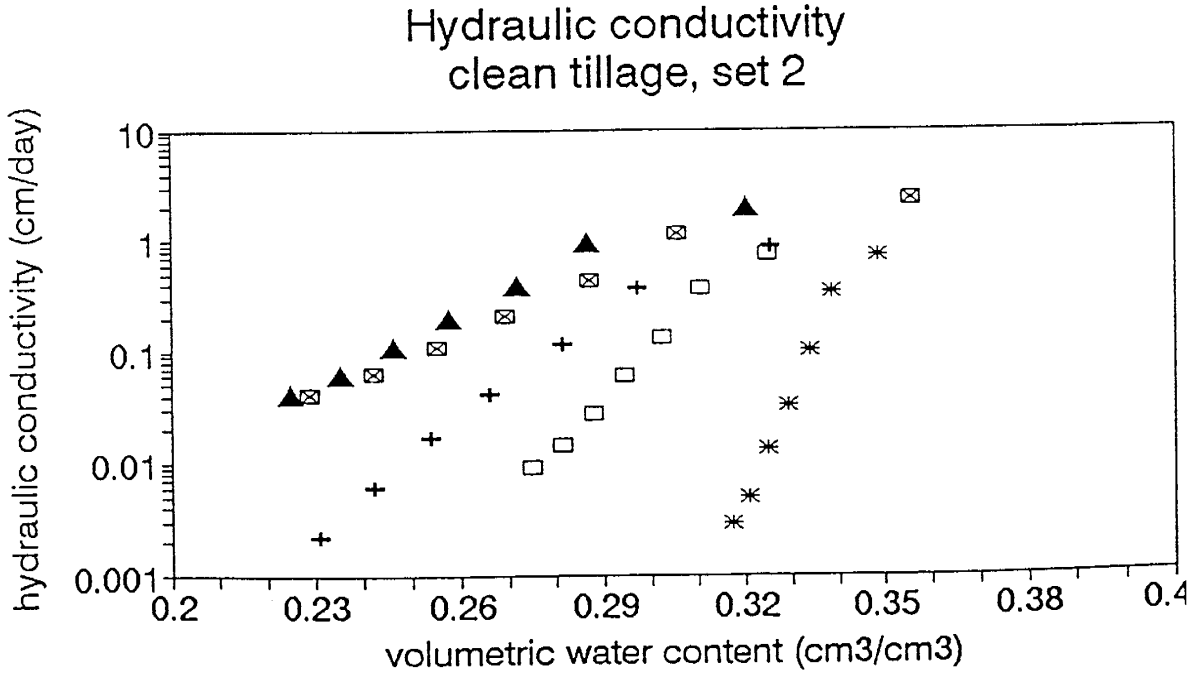
Appendix J: Soil water retention and hydraulic conductivity values for all data sets.

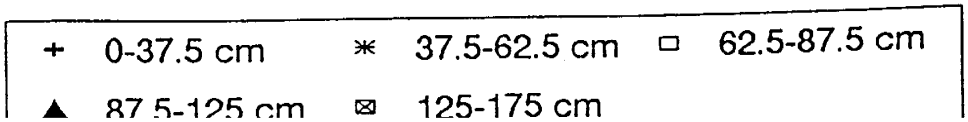


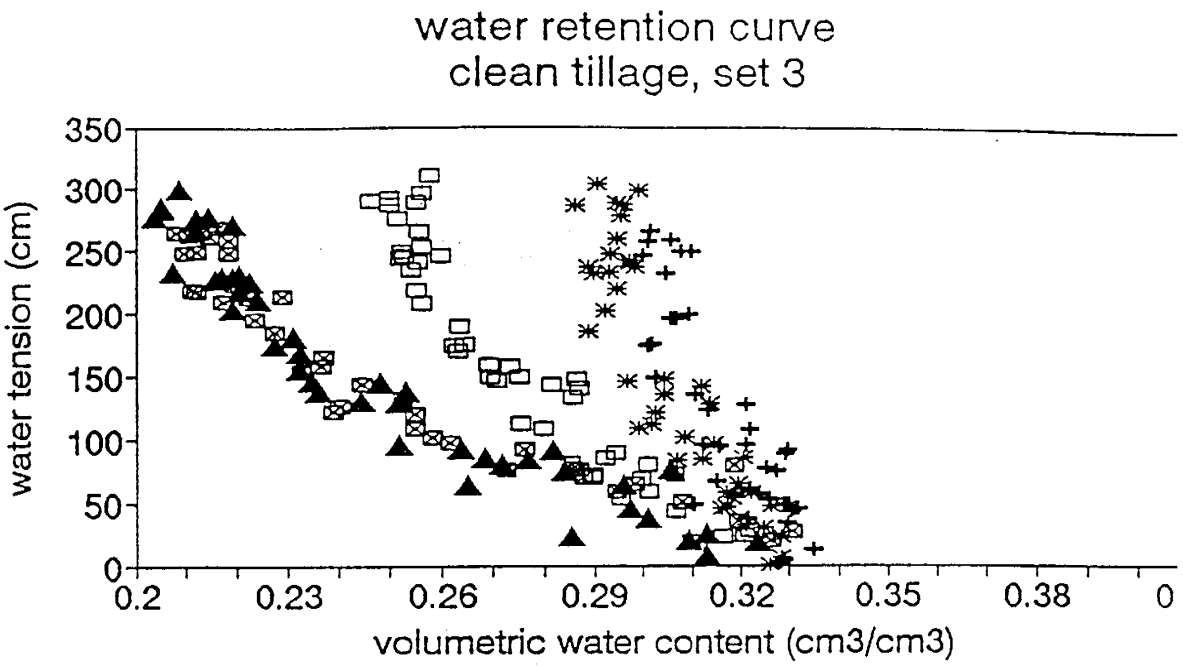


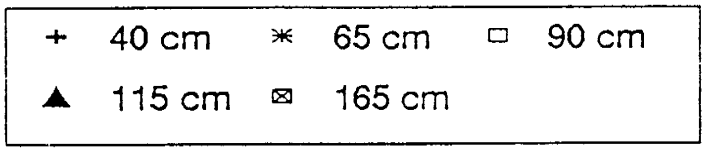

Water retention curve
clean tillage, set 2
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)

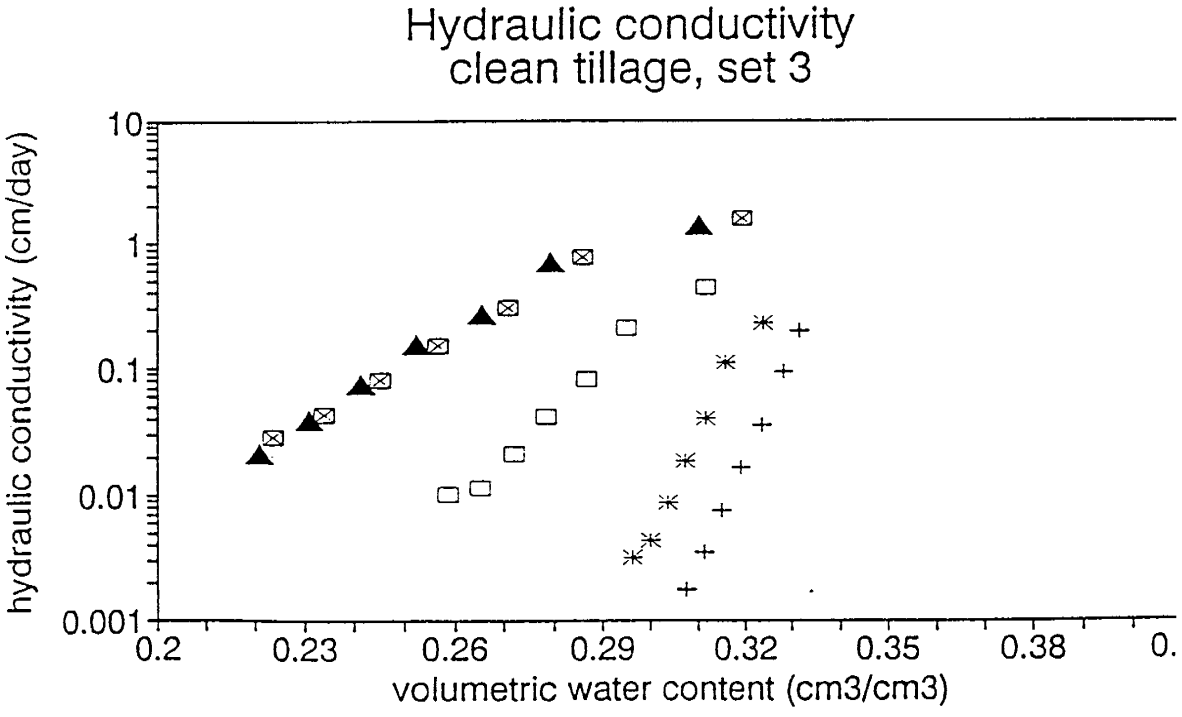

25 cm
50 cm
75 cm
100 cm
150 cm

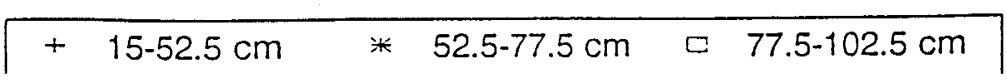

Hydraulic conductivity
clean tillage, set 2
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)

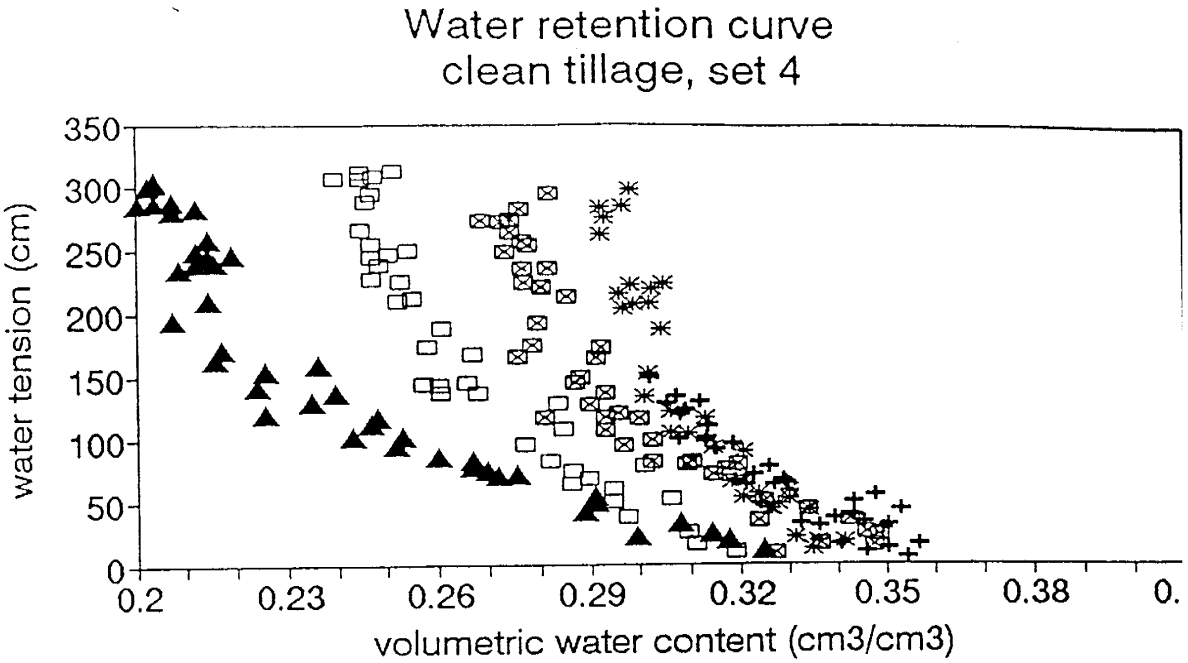

0-37.5 cm
37.5-62.5 cm
62.5-87.5 cm
87.5-125 cm
125-175 cm

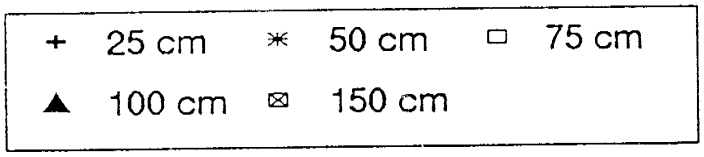

water retention curve
clean tillage, set 3
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0
volumetric water content (cm3/cm3)

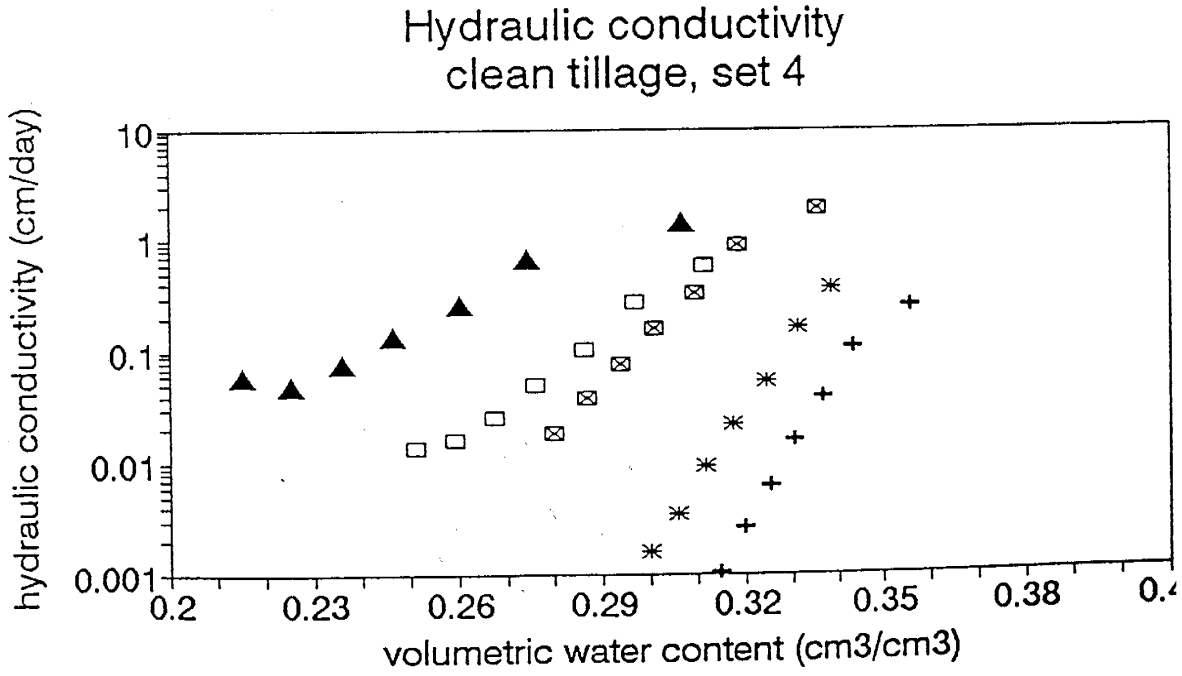

40 cm
65 cm
90 cm
115 cm
165 cm

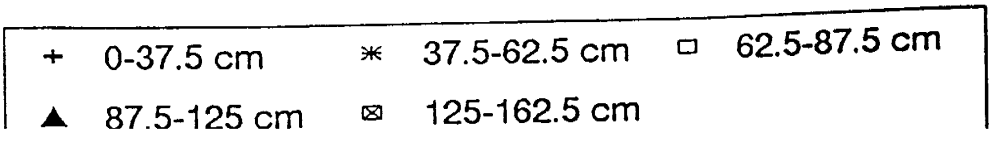

Hydraulic conductivity
clean tillage, set 3
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.
volumetric water content (cm3/cm3)

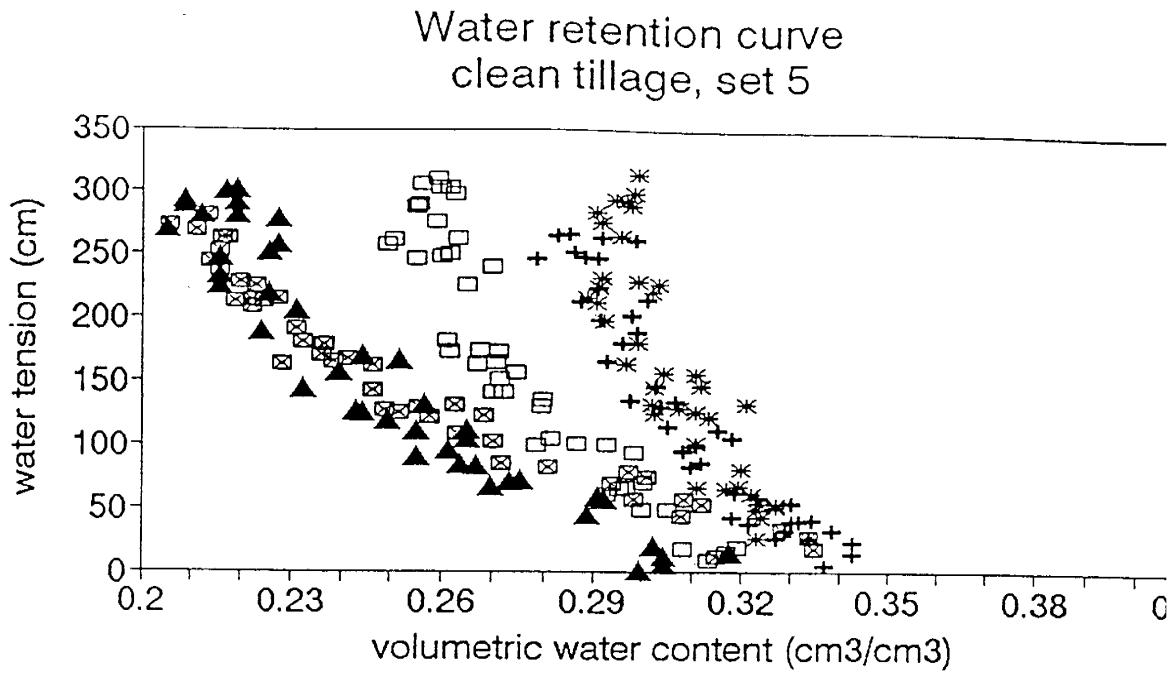

15-52.5 cm
52.5-77.5 cm
77.5-102.5 cm

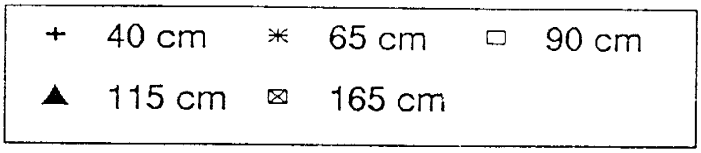

Water retention curve
clean tillage, set 4
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.
volumetric water content (cm3/cm3)

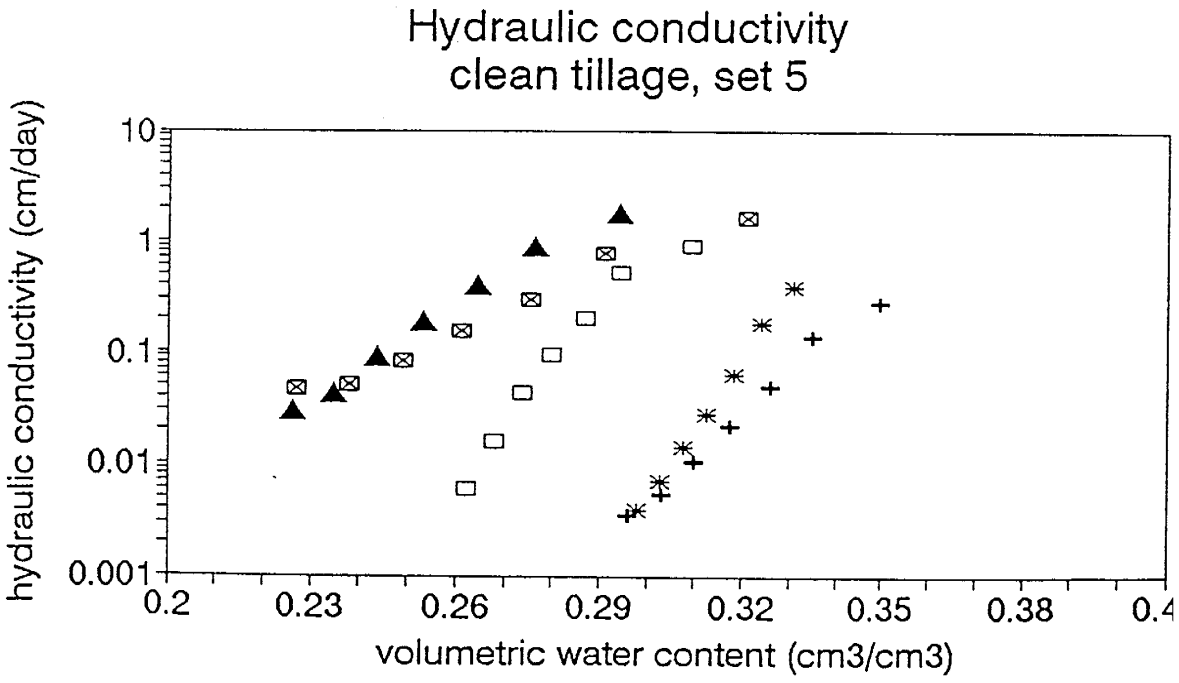

25 cm
50 cm
75 cm
100 cm
150 cm

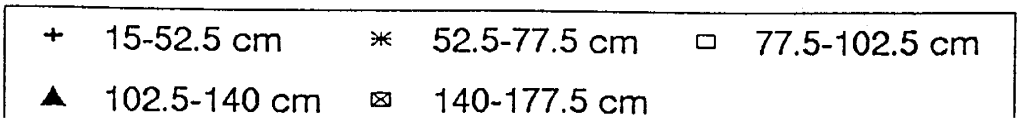

Hydraulic conductivity
clean tillage, set 4
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)

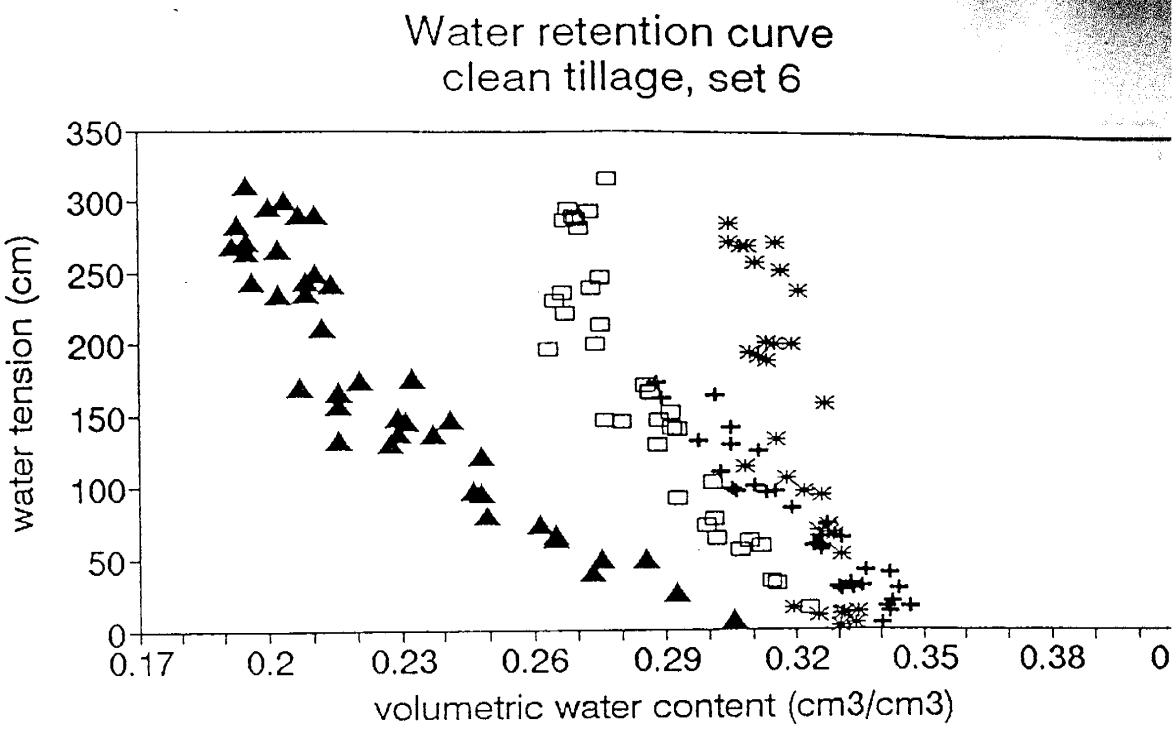

0-37.5 cm
37.5-62.5 cm
62.5-87.5 cm
87.5-125 cm
125-162.5 cm

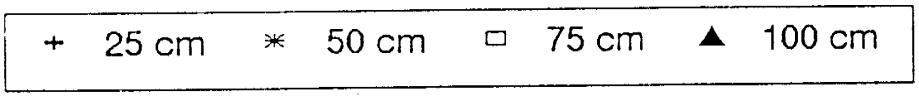

Water retention curve
clean tillage, set 5
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
volumetric water content (cm3/cm3)

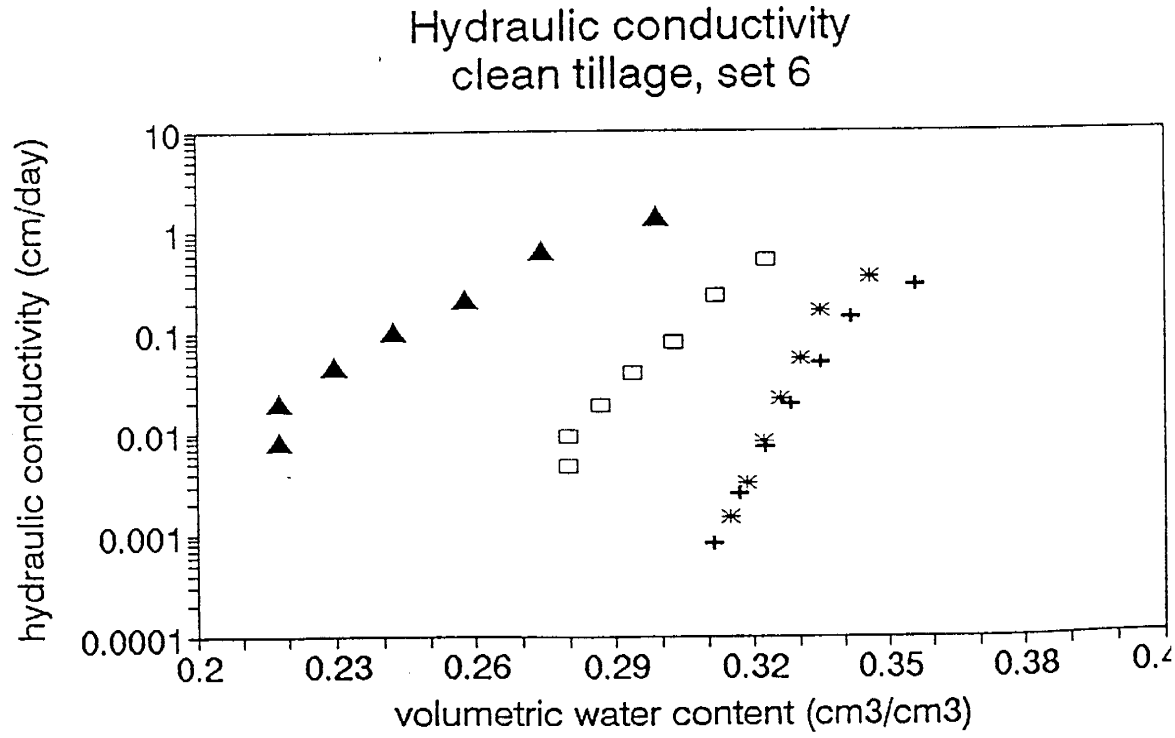

40 cm
65 cm
90 cm
115 cm
165 cm

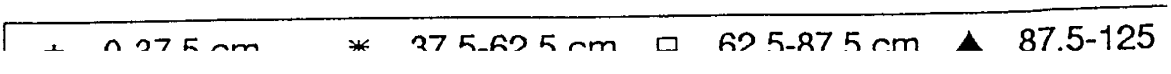

Hydraulic conductivity
clean tillage, set 5
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
volumetric water content (cm3/cm3)

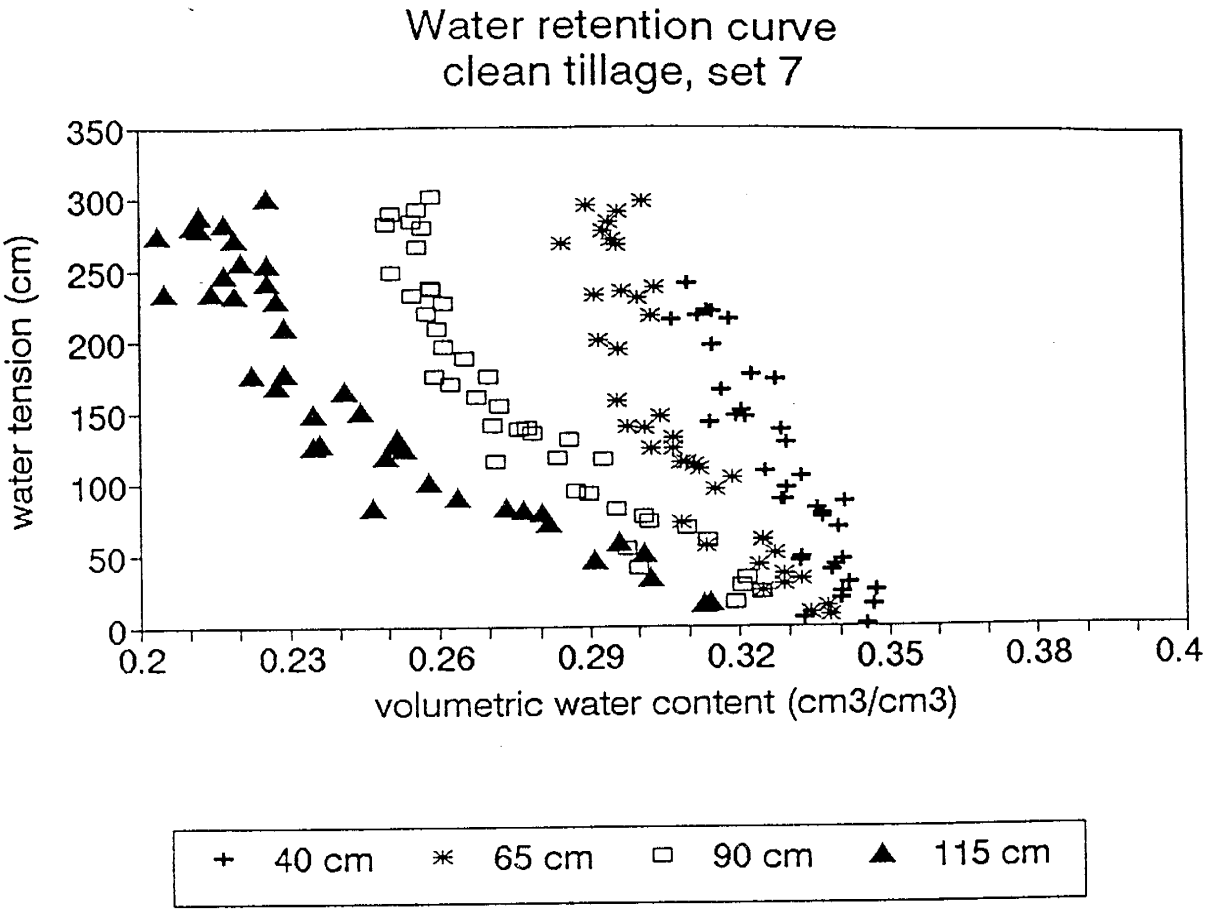

15-52.5 cm
52.5-77.5 cm
77.5-102.5 cm
102.5-140 cm
140-177.5 cm

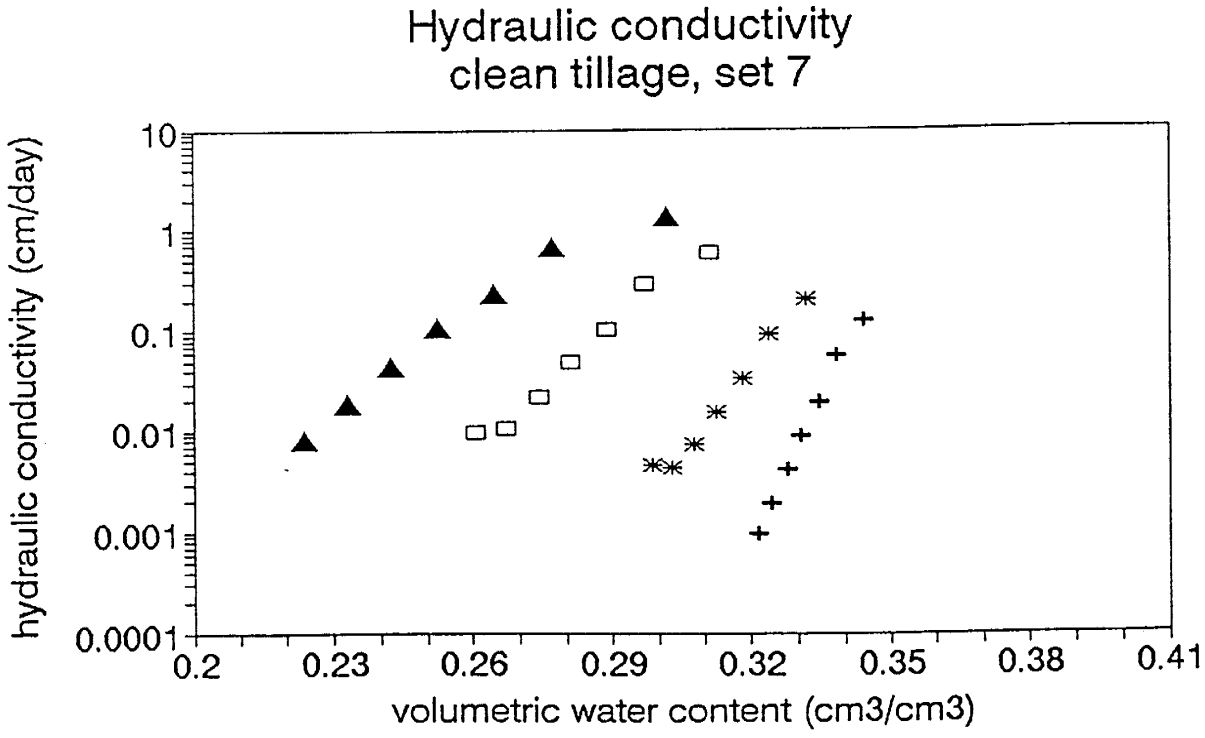

Water retention curve
clean tillage, set 6
water tension (cm)
350
300
250
200
150
100
50
0
0.17
0.2
0.23
0.26
0.29
0.32
0.35
0.38
volumetric water content (cm3/cm3)

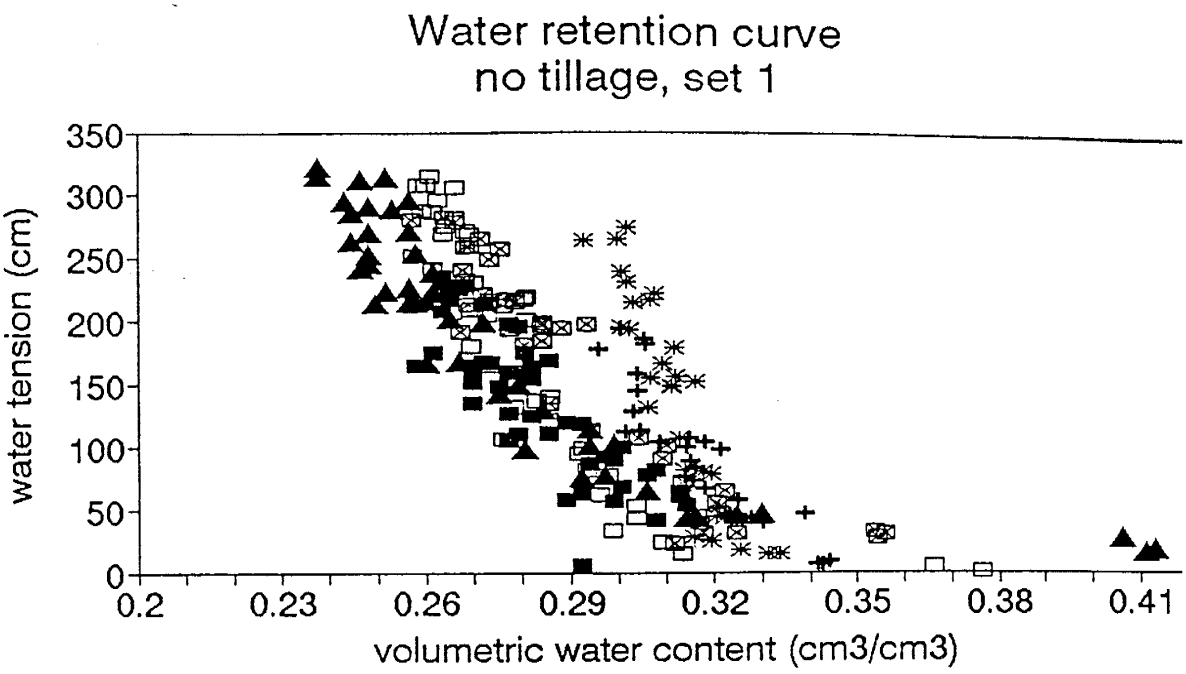

25 cm
50 cm
75 cm
100 cm

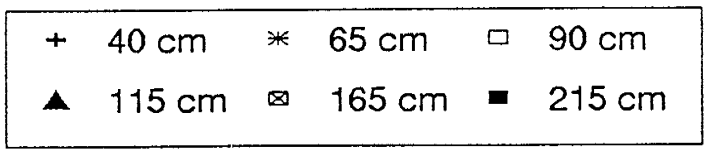

Hydraulic conductivity
clean tillage, set 6
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.0001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
volumetric water content (cm3/cm3)

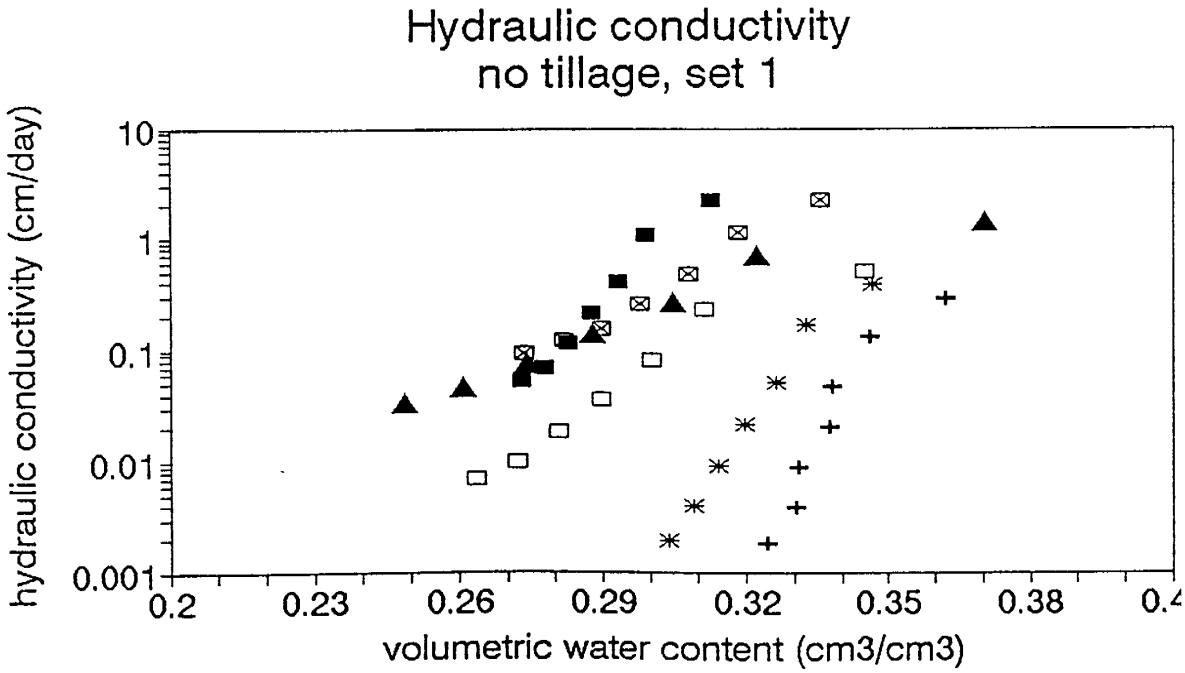

0-37.5 cm
37.5-62.5 cm
62.5-87.5 cm
87.5-125

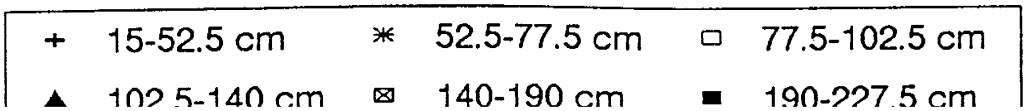

Water retention curve
clean tillage, set 7
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)
+ 40 cm
* 65 cm
□ 90 cm
▲ 115 cm

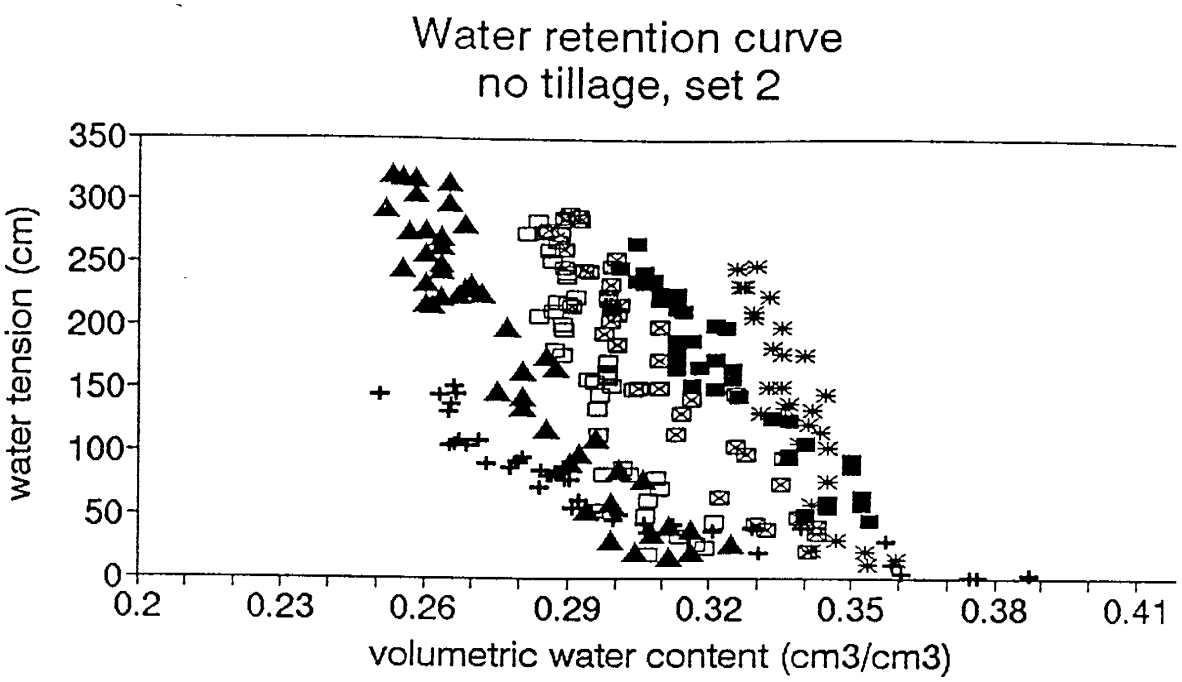

Hydraulic conductivity
clean tillage, set 7
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.0001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)
+ 0-37.5 cm
* 37.5-62.5 cm
□ 62.5-87.5 cm
▲ 87.5-125 cm

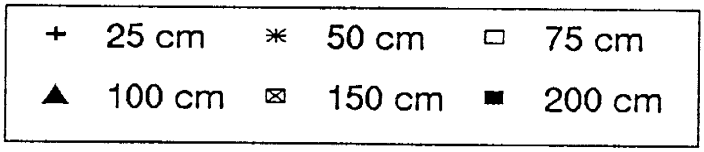

Water retention curve
no tillage, set 1
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)

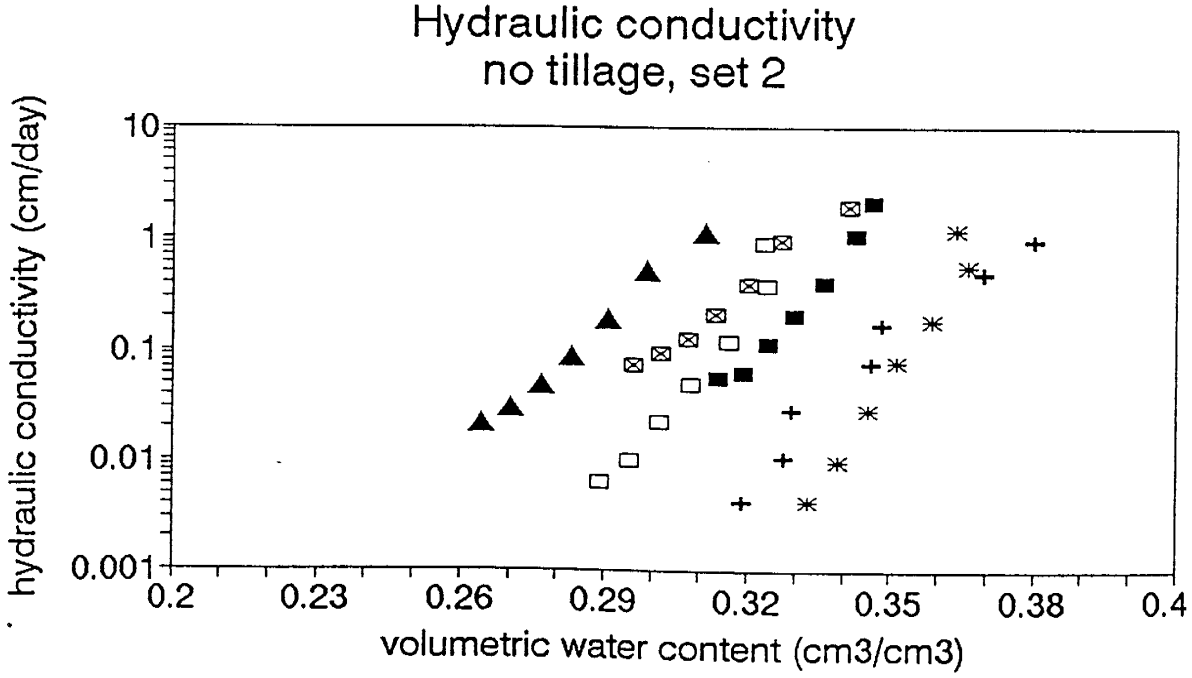

40 cm
65 cm
90 cm
115 cm
165 cm
215 cm

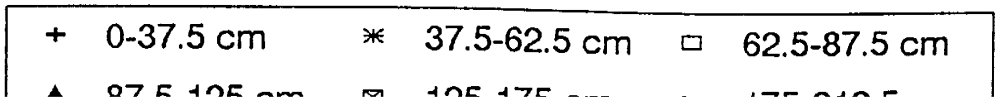

Hydraulic conductivity
no tillage, set 1
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
volumetric water content (cm3/cm3)

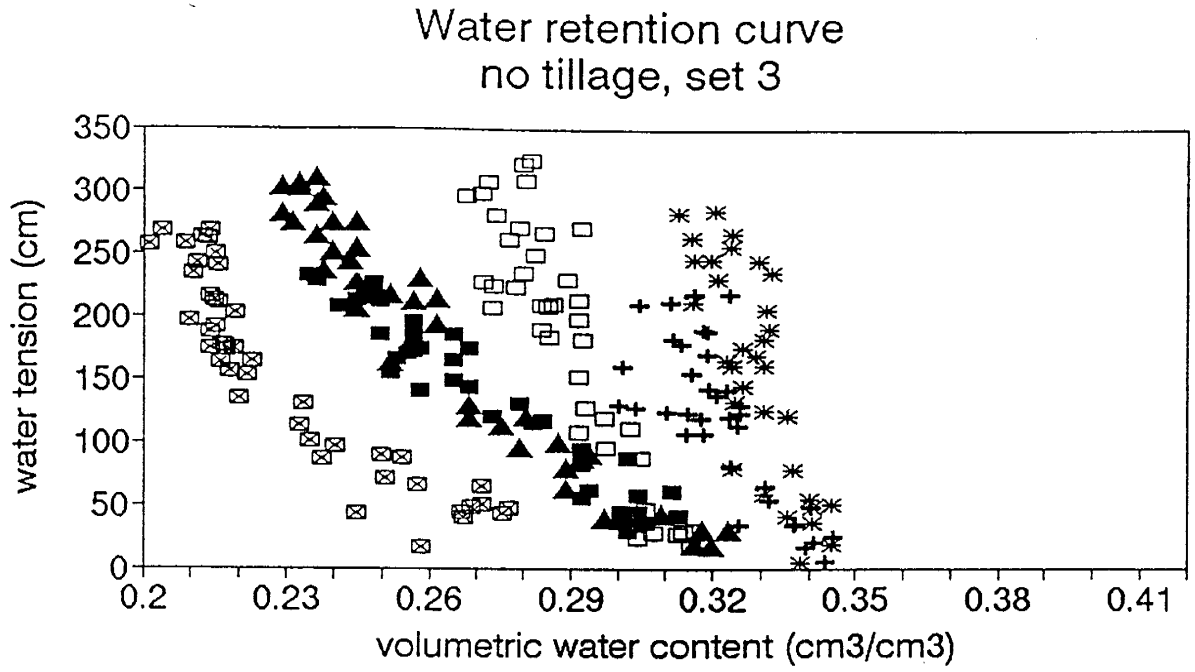

15-52.5 cm
52.5-77.5 cm
77.5-102.5 cm
102.5-140 cm
140-190 cm
190-227.5 cm

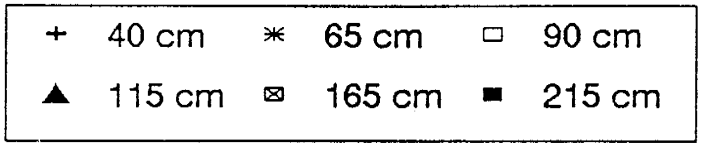

Water retention curve
no tillage, set 2
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)

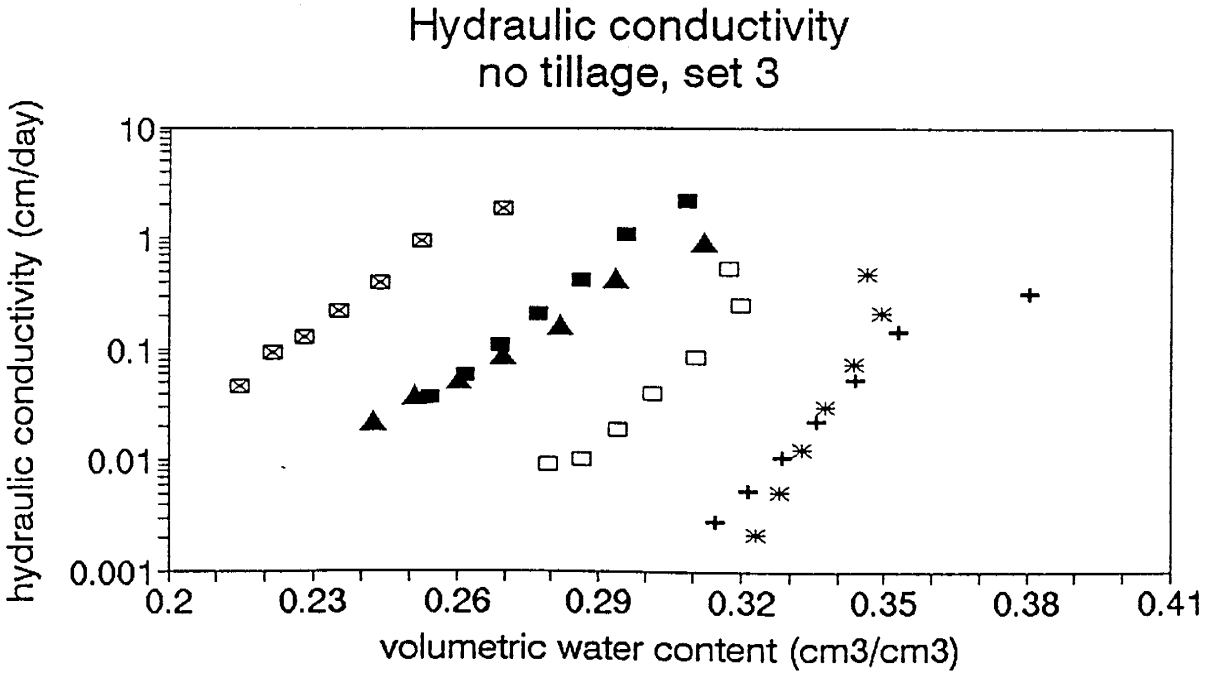

25 cm
50 cm
75 cm
100 cm
150 cm
200 cm

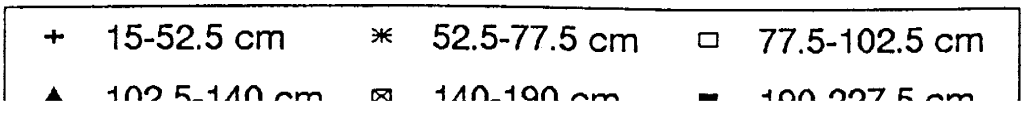

Hydraulic conductivity
no tillage, set 2
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)

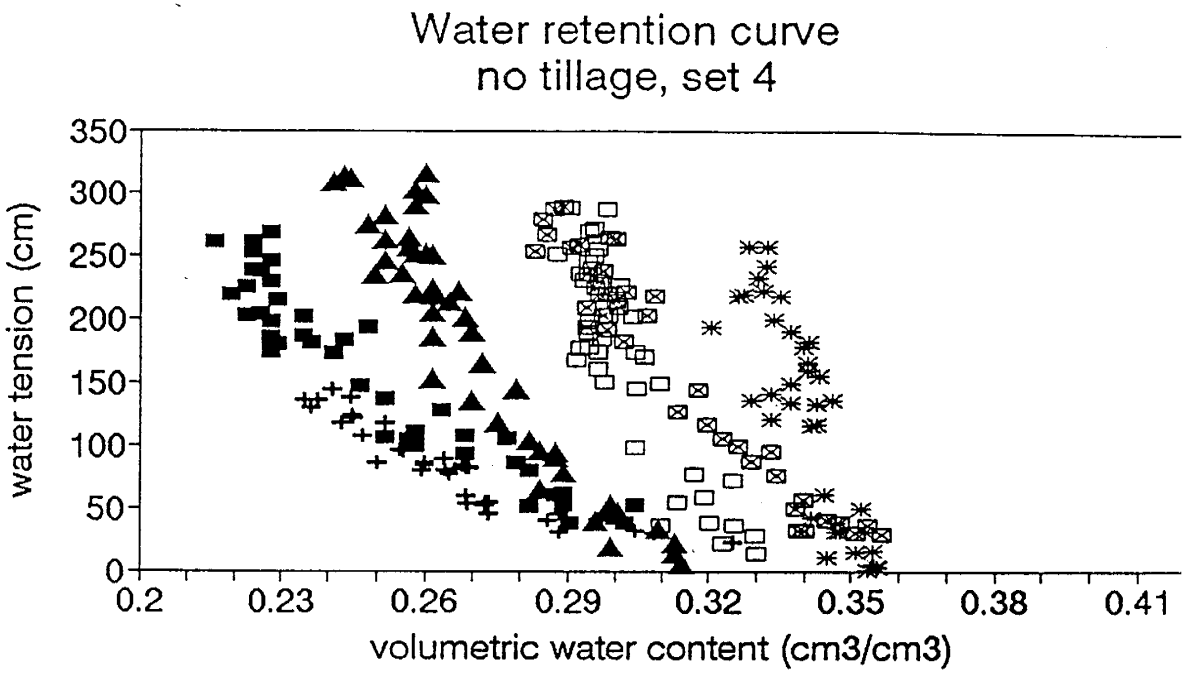

0-37.5 cm
37.5-62.5 cm
62.5-87.5 cm

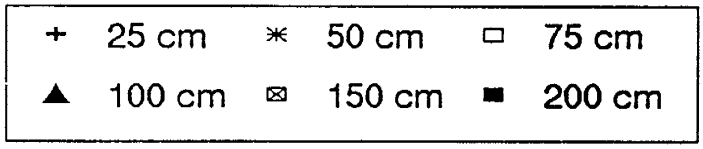

Water retention curve
no tillage, set 3
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)

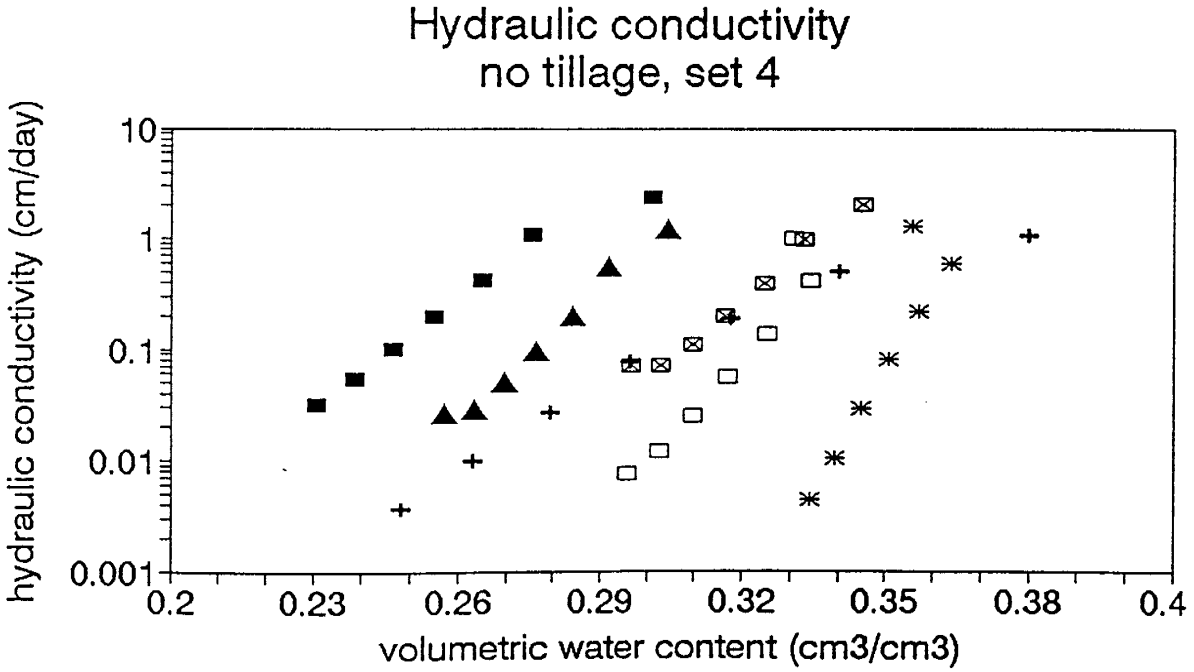

40 cm
65 cm
90 cm
115 cm
165 cm
215 cm

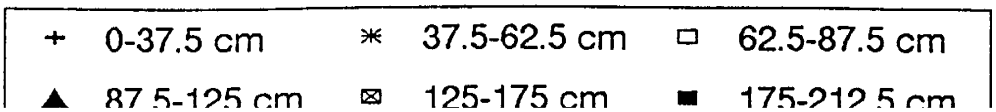

Hydraulic conductivity
no tillage, set 3
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)

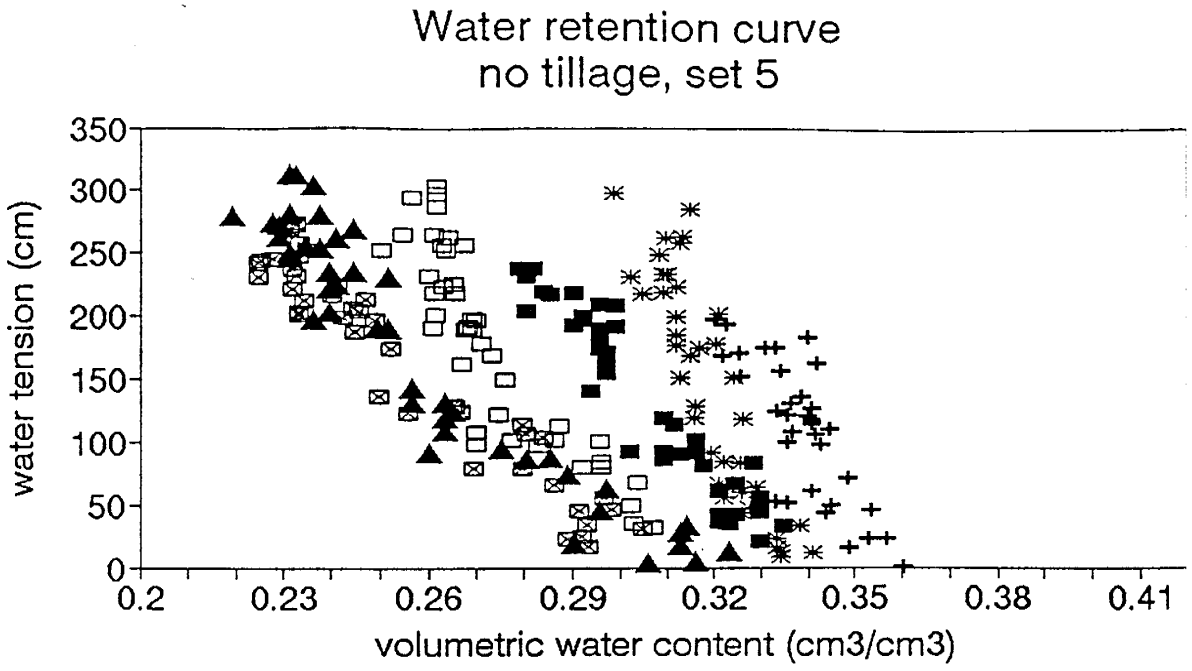

15-52.5 cm
52.5-77.5 cm
77.5-102.5 cm

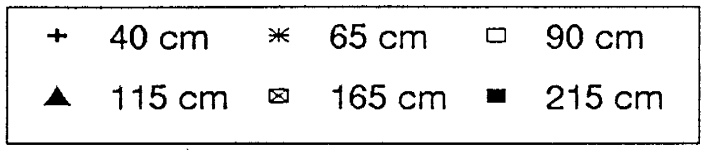

Water retention curve
no tillage, set 4
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)

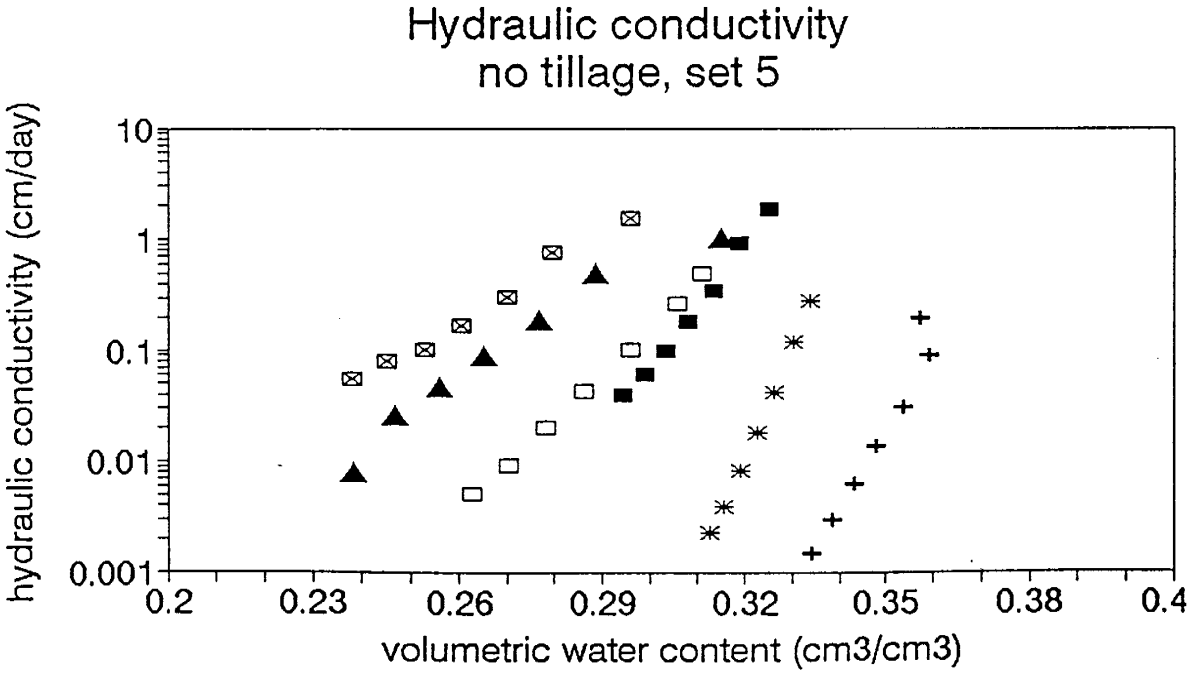

25 cm
50 cm
75 cm
100 cm
150 cm
200 cm

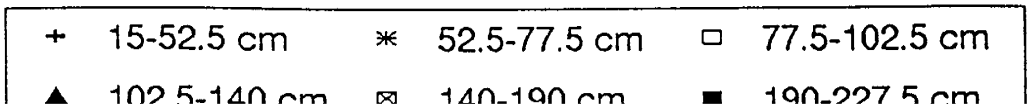

Hydraulic conductivity
no tillage, set 4
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)

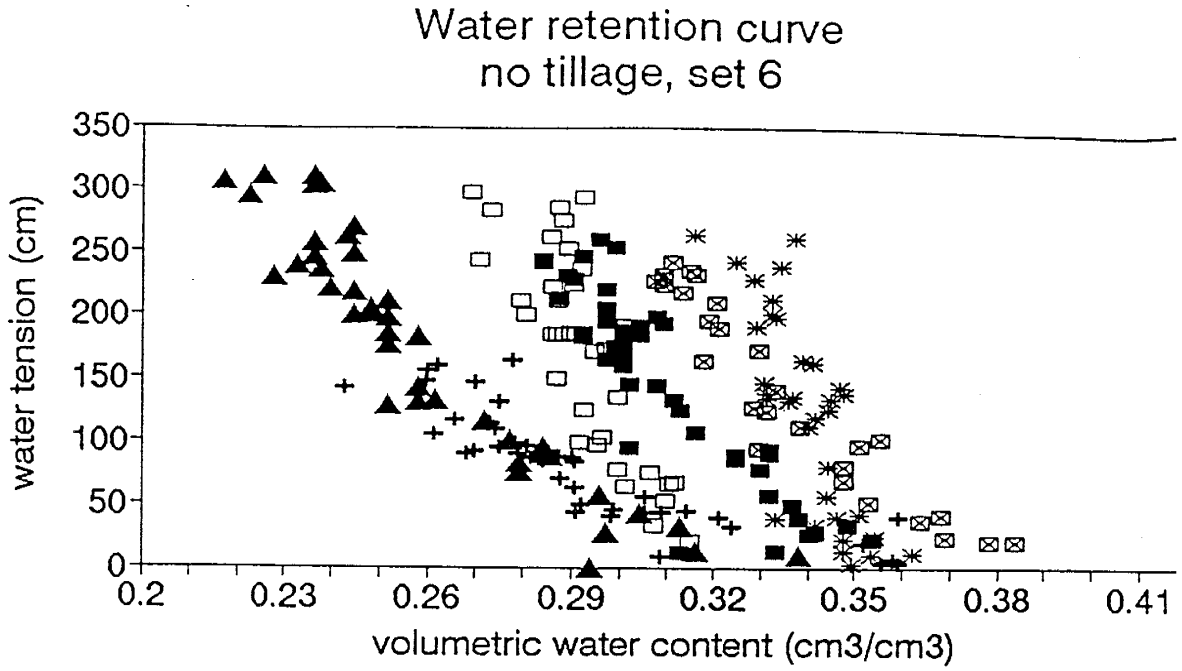

0-37.5 cm
37.5-62.5 cm
62.5-87.5 cm
87.5-125 cm
125-175 cm
175-212.5 cm

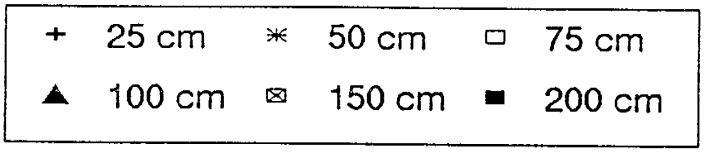

Water retention curve
no tillage, set 5
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)

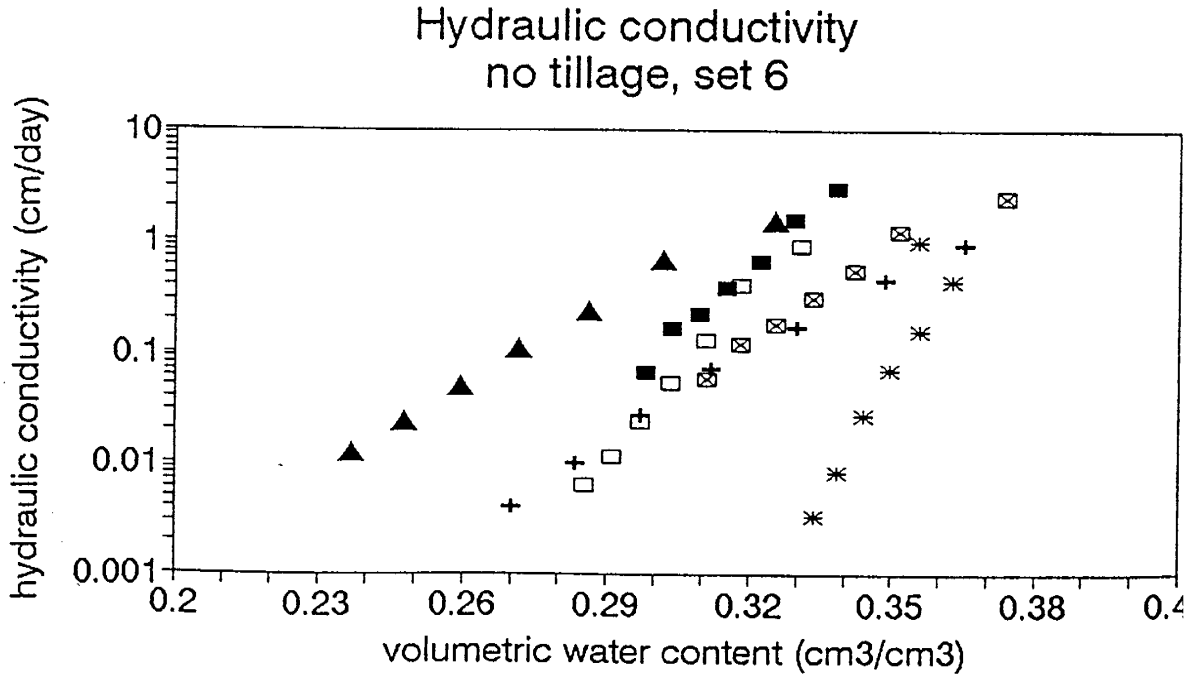

40 cm
65 cm
90 cm
115 cm
165 cm
215 cm

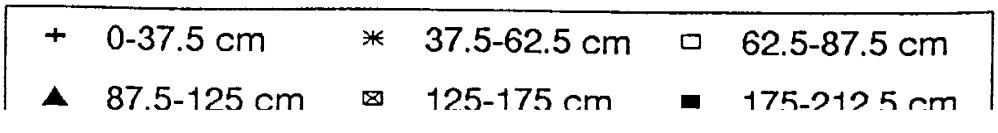

Hydraulic conductivity
no tillage, set 5
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)

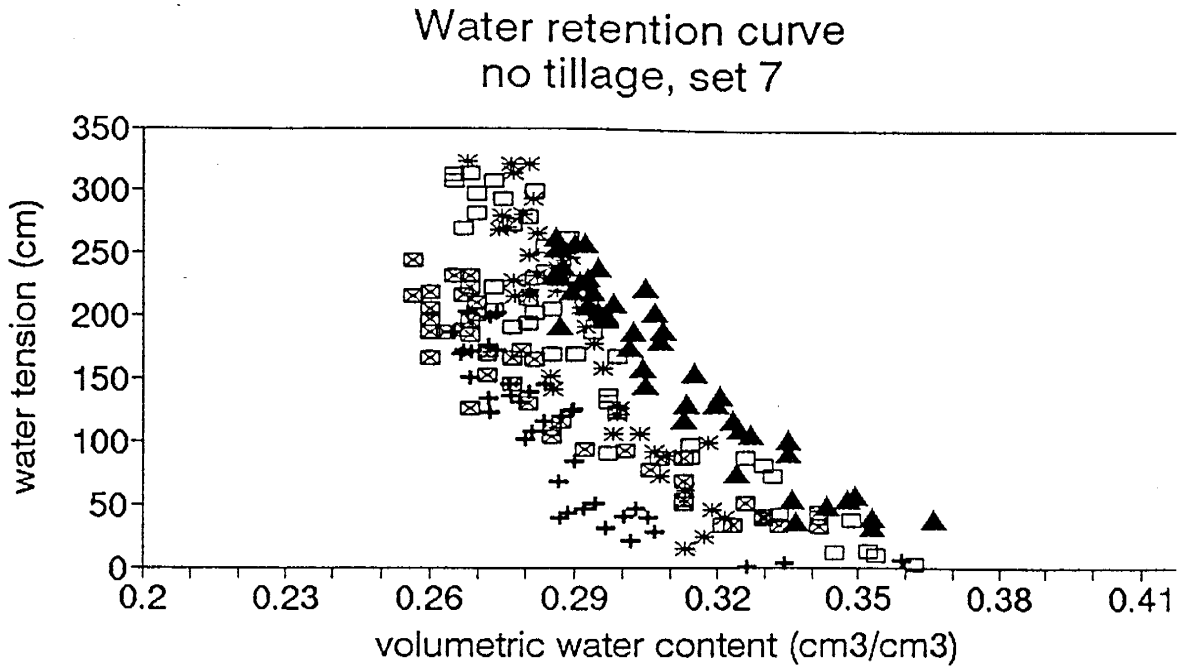

15-52.5 cm
52.5-77.5 cm
77.5-102.5 cm
102.5-140 cm
140-190 cm
190-227.5 cm

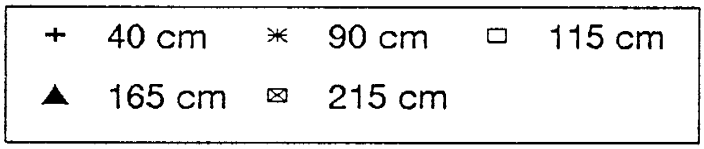

Water retention curve
no tillage, set 6
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)

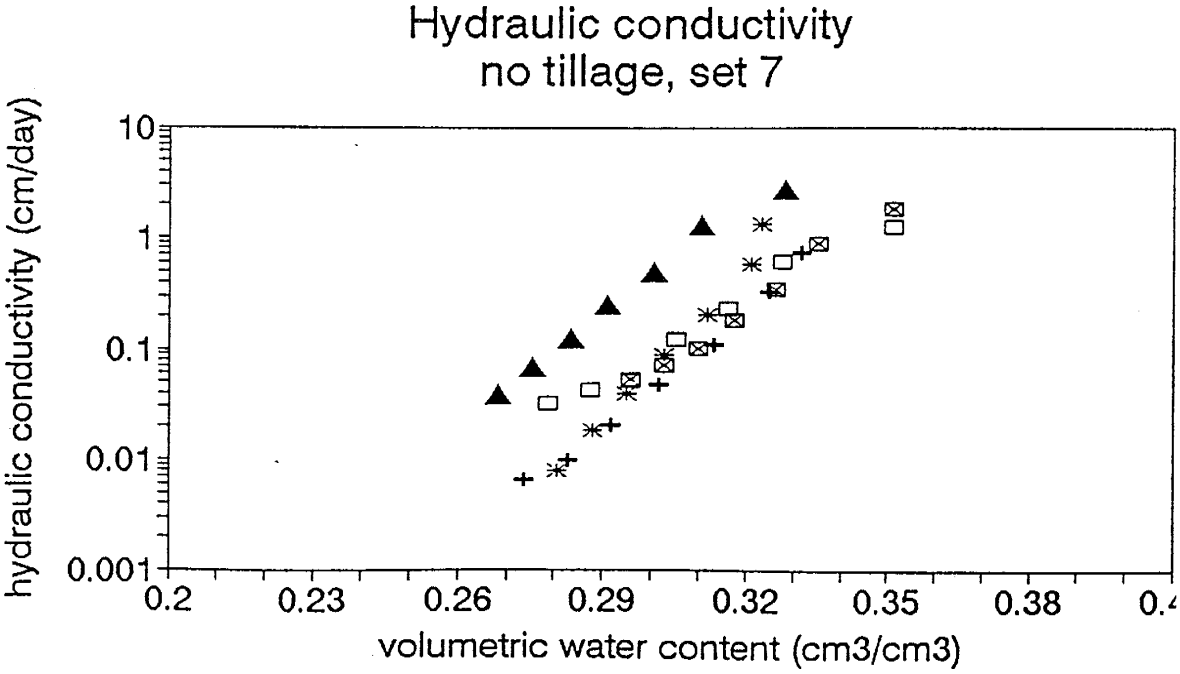

25 cm
50 cm
75 cm
100 cm
150 cm
200 cm

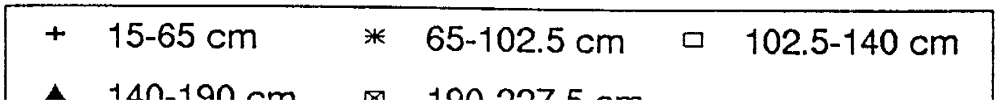

Hydraulic conductivity
no tillage, set 6
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.4
volumetric water content (cm3/cm3)


0-37.5 cm
37.5-62.5 cm
62.5-87.5 cm
87.5-125 cm
125-175 cm
175-212.5 cm


Water retention curve
no tillage, set 7
water tension (cm)
350
300
250
200
150
100
50
0
0.2
0.23
0.26
0.29
0.32
0.35
0.38
0.41
volumetric water content (cm3/cm3)


40 cm
90 cm
115 cm
165 cm
215 cm


Hydraulic conductivity
no tillage, set 7
hydraulic conductivity (cm/day)
10
1
0.1
0.01
0.001
0.2
0.23
0.26
0.29
0.32
0.35
0.38
volumetric water content (cm3/cm3)


15-65 cm
65-102.5 cm
102.5-140 cm
140-190 cm