

CULTURE SOY – TECHNOLOGY NO-TILL

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Given results of dvokhrichnikh researches are influence of No-till of technology of till of soil on vodno-skriznichni properties of soil and productivity of soy. Expedience of growing of soy is set in the conditions of right-bank forest-steppe of Ukraine after No-till by technology zero cultivation the soil.

Soya, no-till, closeness of soil, humidity of soil, wetness soil, soil-climatic terms, productivity.

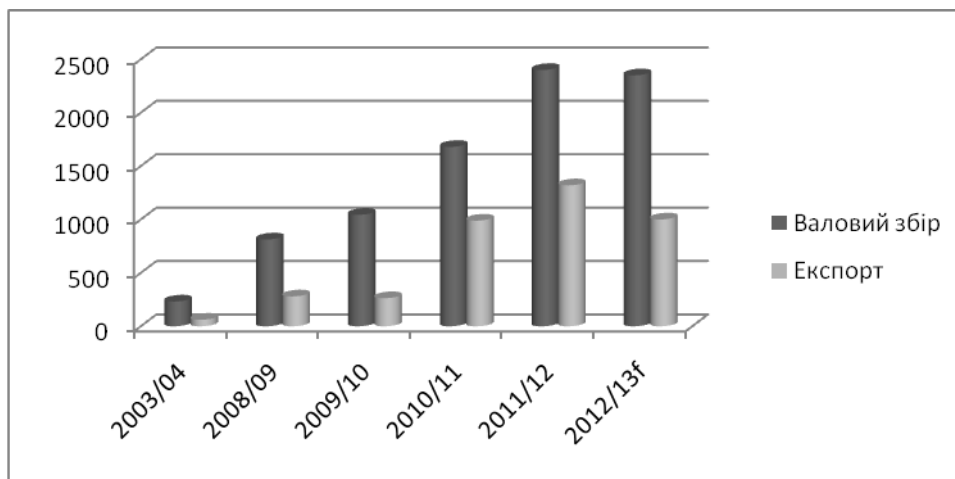
Soya - important feed and industrial crops of agriculture in many countries. She features from other crops distinguished by a rare combination of protein and oil with valuable vitamins and mineral elements.

Its grain soya contains about 40% high quality protein, 20% fat, 30% carbohydrate, 5–6% of various mineral elements. Soy protein for qualitative composition of amino acids closest to animal protein, soy protein thus being considered as the most high quality and cheap in solving the problem of protein deficiency in the world.

In soybean seeds contained complex of biologically active substances and vitamins (A1, B1, B2, C, D, E, K, PP), as well as potassium, calcium, magnesium, phosphorus, and therefore it is widely used in medicine for the manufacture of dietary supplements and drugs.

Soy is a good precursor as capable himself almost entirely to provide nitrogen through symbiotic nitrogen fixation.

The main producers of soy are the United States in the world - about 40% of the global area, Brazil –19%, Argentina–10%. Ukraine over the past 10 years, nearly 10 times increased production and exports of soybean [1] (Fig. 1). It is grown in the area Barrens - 52.3% of crops in the area of Forest - 45% and 27% - in Polissya zone.



Pic. 1. Production and export of soybeans in Ukraine.

In each zone there are growing number of natural factors (amount of moisture in the spring and summer, the level of fertility of the soil temperature conditions) that limit its distribution and productivity, as well as a factor that reduces the effectiveness of soy - a growing technology.

Big costs for conventional technologies due plowing, repeated riznohlybynnym preplant and pislyaposivnym cultivation, encourage farmers to implement in production and research and development guidelines that ensure the growth of productivity and reduce production costs.

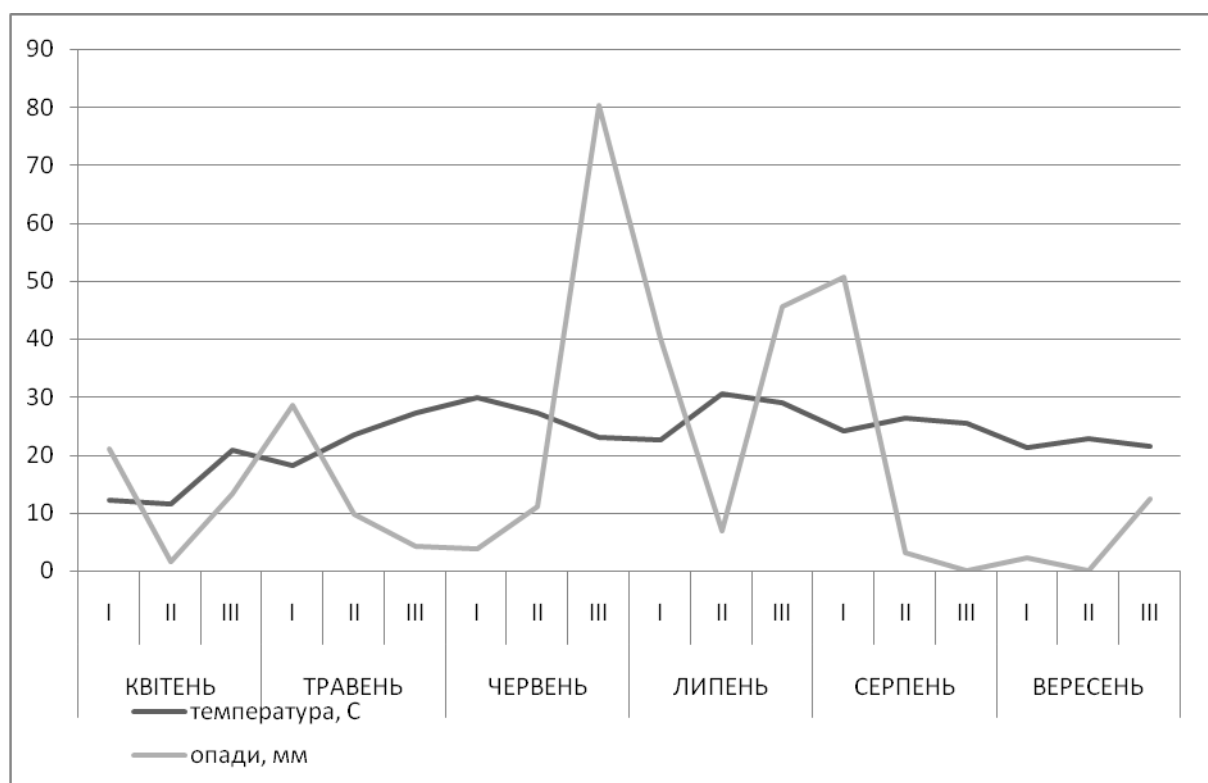
Today, one of the promising technologies of the future is the technology of zero tillage (No-till) in which there is no any mechanical impact on soil and all plant residues remain on the surface.

In 2011-2012, conducted a study on the effectiveness of technology conventional tillage and zero in soybeans.

Experiments were carried out in field laboratory of the Department of Agriculture and Herbiology National University of Life and Environmental Sciences of Ukraine (in agronomic research station in Vasilkivskii District, Kyiv region) in short rotation crop rotation with alternating crops: maize - soybean - spring barley.

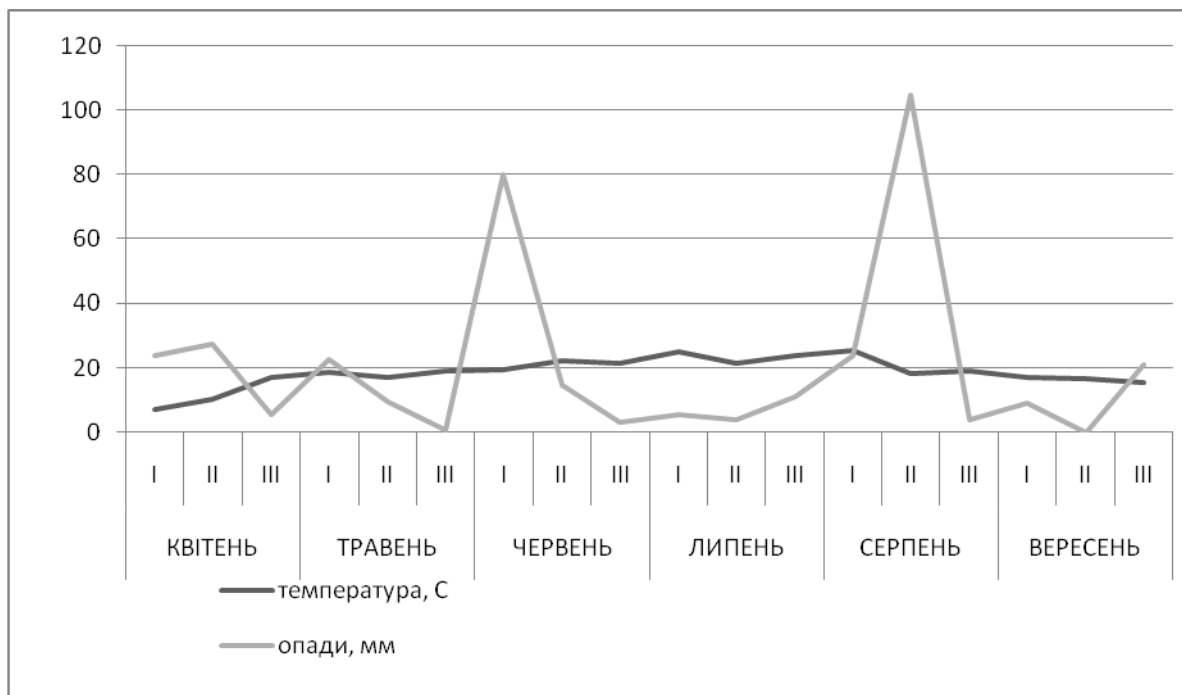
Soil research field chernozem typical, low humus, lehkosuhlynkovyy. The humus content in the plow layer - 4,34-4,68%, pH - 6,8-7,3, absorption capacity - 30,7-32,5 meq per 100g of soil, the amount of total nitrogen - 0,21-0 30%, phosphorus - 0.15-0.25%, potassium - 2.3-2.5%.

Weather conditions in 2011, 2012. in their performance did not provide the requirements of plants in full (Pic. 2, 3).



Pic. 2. Weather conditions growing season in 2011

The graphs shows uneven rainfall. Thus, starting from the first decade of April and almost into the second decade of June there was the dry period. In April, the amount of precipitation was - 36mm, and in May - 42.5 mm. These conditions resulted in late and unfriendly stairs soybeans. In June - July rainfall was 80-50mm. In the period when the plant needs the greatest amount of precipitation, and this month of August, their number does not exceed 10mm.

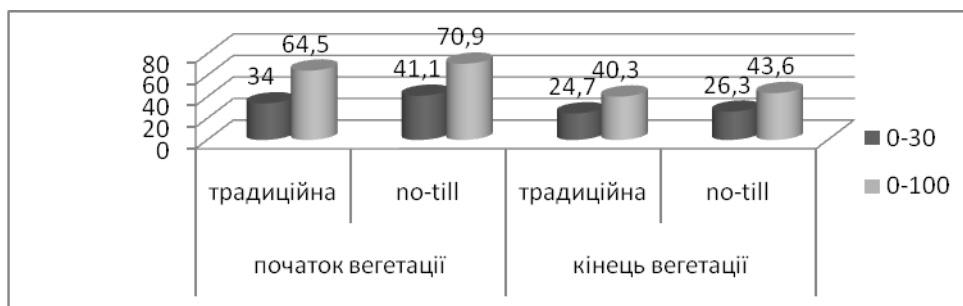


Pic.3. Weather conditions growing season of 2012.

In 2012 by the rainfall during the growing season was more favorable for plants and for uniformity of their fall analogichchnyy 2011roku (fig.3). This uneven rainfall are more influenced by the level of productivity of crops and tillage technology in these conditions has acted as a factor of influence on the conservation of soil moisture for the later use of its by plants.

The air temperature in the studied years was at multi-year norm only in the summer months it exceeded long rates.

The data content of available soil moisture (Picture 4) indicate the superiority of zero tillage technology over traditional.



Pic. 4. Inventories of available moisture depending on the technology of its cultivation, mm (mean for 2011-2012.)

Thus, at the beginning of the growing season, supplies available moisture in the soil layer 0-30 and 0-100cm for zero tillage technology were 41.1 mm and 70.9 mm,

which is 11-20% higher than traditional. In the soil layer 0-5cm supply of moisture was 10.5 mm at zero technology and 8.1 mm in the traditional. Number of available moisture at the end of the growing season of plants in the plow layer soil No-till was 29.7 mm in meter layer of soil - 48.9 mm, while traditional technology tillage 26.4 mm and 44mm respectively

So moisture reserves in the soil layer korenevnoy 12% greater than zero technology, which is important in terms of drought and high temperatures for a long period.

Thus, the absence of mechanical tillage in No-till eliminates water loss through convective-diffusive evaporation. This is facilitated by the presence of the ground plant residues [4].

One complex agrophysical indicators that best reflects the totality of the physical properties of the soil is - its density. Study of density between the soil and the development of cultivated plants, as vidmichav I.B.Revut [3] is one of the important tasks of theoretical justification of rational methods of its cultivation.

Density of soil depending on the technology of its cultivation, g/cm³

Technology tillage	Layers of soil, cm			
	0-5	5-10	10-20	20-30
Ladder, 2011p.				
Traditional	0,98	1,15	1,12	1,13
No-till	1.15	1.31	1.31	1.34
Collection, 2011p.				
Traditional	1.04	1.17	1.12	1.24
No-till	1.13	1.25	1.31	1.23
Ladder , 2012p.				

Traditional	0.93	0.88	1.18	1.21
No-till	1.13	1.26	1.29	1.23
Collection, 2012p.				
Traditional	1.08	1.16	1.19	1.24
No-till	1.03	1.14	1.19	1.11

Data Table 1 indicate that the density of the soil at the option No-till on the planting soybeans in soil layers 0-5, 5-10, 10-20, 20-30cm on average 17% higher in comparison with the traditional one. And this is logical because traditional technology provides presowing tillage cultivation, particularly harrowing, cultivation, providing density of treated soil within 0,90-1,01 g/cm³

But after artificial provide optimum soil density, it is in this state for a short time. After 1.5-2 months under various natural factors of soil density becomes close to equilibrium.

Experimentally that instrument mechanical cultivation more intense than natural processes affecting soil density. In vivo ranges of density influenced by changes in humidity and temperature ranges from + / - 0.05 g/cm³.

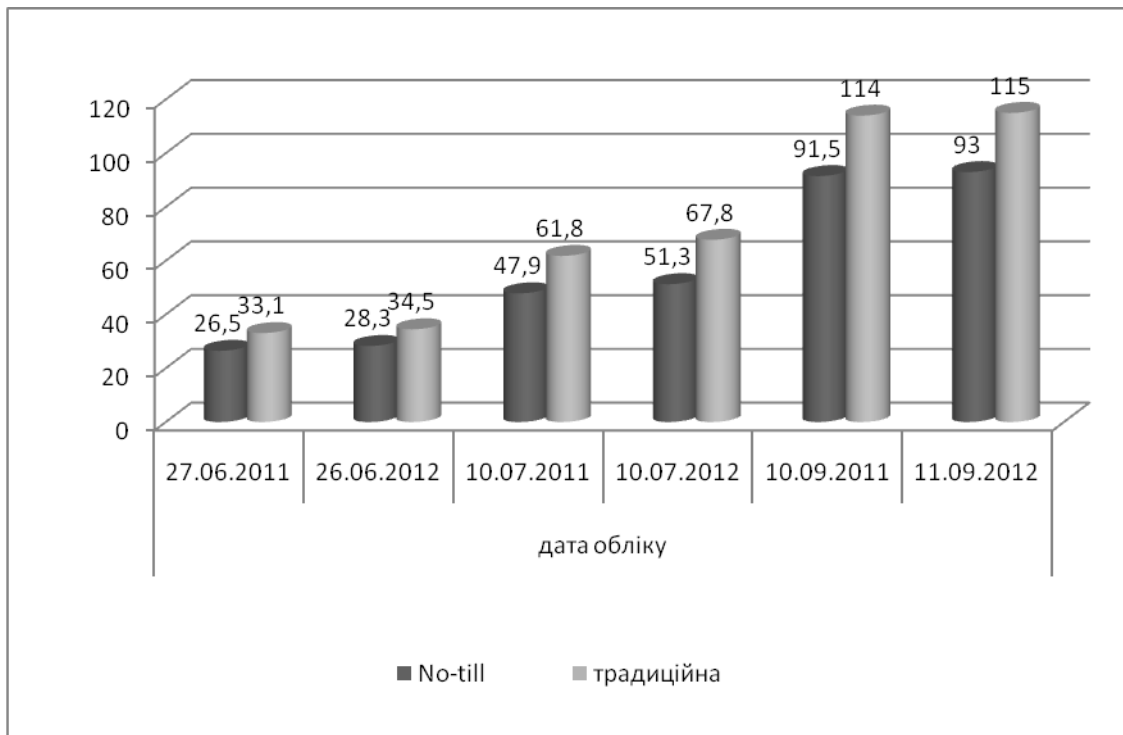
Depending on the type of root system, this range increases slightly and is + / - 0,20-0,30 g/cm³, while mechanical cultivation, such as humus medium or hard suhlynkovo size distribution, it can be up to + / - 0.4 g/cm³ [2].

Our research showed that zero tillage technology during the growing season is thinning soil through intensive growth of plant roots of soybean and the presence of moisture in the plow layer.

With traditional technology for plant vegetation soil density increases by an average of 17-20%, which is associated with mechanical tillage, which breaks down soil aggregates and promotes unproductive water loss due to evaporation.

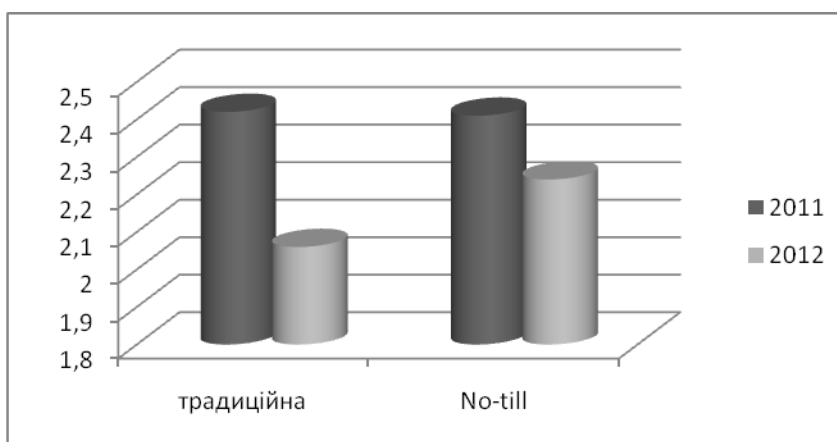
In general, during the years of research on both soil density variations do not exceed the optimal parameters for a given soil type.

Very important figures in the study of soil technology is biometric indicators plants. It is for them we can infer how feels culture and could count on the harvest.



Pic.5. Plant height of soybean depending on the technology of soil

Analyzing figure 5 we see that the plants of soybean by traditional technology tillage observed more intense growth compared to grow us No-till. This is because under the same terms of sowing soil temperature at traditional technology +3-5 0C higher than soil temperature at zero tillage technology. This difference in temperature due to the presence on the surface of plant residues and higher soil moisture at the option of zero technology.



(HIP05=0,099т.)

Pic.6 Yield soybean technology depending on the soil, t / ha

Slow warm soil at zero technology leads to complete germination for 4-6 days later compared to traditional technology. Thus, plants in the first half of the vegetation grow slowly, they are smaller in size, and in the second half of vegetation occurs when a set of adverse weather and climatic conditions (high soil temperature, no precipitation) plants at zero technologies grow more intense form higher yield, about evidenced by Pic. 6.

Analyzing pic. 6 should be noted that the yield on tillage options for the year 2011 is at the same level of 2.4 t / ha, while in 2012 the difference in average of 0.2 t / ha in favor of No-till. The difference in yield years in traditional technology is significant and nearly 0.4 tons / ha. , While in No-till technology - the difference is 0.17 t / ha.

Thus the study shows that the technology of zero tillage (No-till) better preserves soil moisture and reduces moisture loss by evaporation. A late germinating soybean seeds with zero tillage offset by intense growth and development of plants in the later stages due to better moisture.

No-till provides a stable harvest crops for the year, compared with traditional cultivation technology that allows to state whether its cultivation in the area Elder.

List of references:

1. Kolesnik, M. Zernovoy Olympus / M. Kolesnik / / eXclusive technology. - 2012. Number 6.S. 12– 13.
2. Kosolap MP system of farming No-till / MP Kosolap, AP Krotinov. –K.: Logos. 2011. S. 352.
3. Revut I.B. Physics soils / I.B.Revut.–L.: Colossus. 1964 p.S. 320.
4. No-till - step to perfect farming. - K.: Vidavnitstvo "Grain", CJSC "she Groshi World", 2007. - 53 -58.