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THE FEATURES OF FORMING THE CORN'S PRODUCTIVITY ON PEAT SOILS IN FOREST-STEPPE ZONE OF UKRAINE

This article is shown us the role and effectiveness of the main cultivation of the soils and manures in forming the corn's productivity on dried soils in humid zone of Ukraine. Shown the results of change the humidity of soil depending on main cultivation of the layer of perennial grasses. Highlighted the influence of background fertilization and main cultivation of soil on changing the elements of corn productivity, apart of the plants height, the cob length, the mass of 1000 seeds and yield of grain.

Key words: *dried soils, the main cultivation of soil, manure, corn, productivity*

Introduction. The peat soils in humid zone of Ukraine are the unavailable creation of nature with high potential productivity. About half a century have been leading the scientific researches of studying the features of peat soils, changes from the anthropogenic reasons, the plants adaptation to specific conditions of dried soils and getting the high yields by minimum cost on production [1]. During the research leading on dried soils with changes and the direction of researches, which certainly represent the qualitative and quantitative change of chemical composition the peat soils and lead to the reducing the reserve of peat deposits [2,3]. On the base of perennial researches was fixed up, that for optimization the correlation of dried soils the main body must place the perennial grass, the faction, which is about 75-78% and the row crops only 10% [4]. Among the row crops the attention should be paid the introduction of crops because it growing can provide the getting more than 100t/ha green mass, 25-30t dry substance and about 10 t/ha grain. Besides the plants leave after themselves a huge number of nutrient-rich pulp remnants. Leading in the structure the sown area of corn promotes not only the strengthening food base, but promotes the improving of agronomic conditions the soil environment, which with further meadow will provide the getting of high and stable yields perennial grass during a long period.

The researches of previous years [5] mostly connect the selection of best precursor for corn, the dose of mineral manure for getting silo and green mass of corn in the compatible with soy crops and wild turnip and other cultures. Nowadays when you create the new sorts and hybrid of corn on early time of maturation and increased resistance you have possibility to grow the corn for the grain, that's why the urgency is the case studies on getting the grain's production of corn on the long have been plowed dried soils.

According to previous scientists was set, that the perennial grass is not good enough precursor for corn, about significant sodding top-layer soil, which has the low microbiological activity, insufficient aeration and low content of available forms of batteries. That's why developing the layer of perennial grass you should provide the corn's plants by the nutrient elements, in particular potassium, which in peat soils in deficit. Taking into account the ecological situation and market condition, which exist at the improving of annuals crops of relevance is acquired minimization the soil cultivation and also replacement of highly costed mineral manures on multicomponent, concentrate and organic manures in liquid form. Thereby becomes a necessity to lead the scientific researches with studying energy save and economically beneficial technology of growing the corn on grains and determine the most appropriate for using on dried soils. The purpose of our research was setting the most effective elements technology of growing corn for grain on the long have been plowed peat soils and set the effectiveness using different type of manures on the corps of corn's productivity.

Materials and methods. Studies on the productivity of corn in peat soils were conducted during 2011-2012 years.

For the study object was used the peat soils floodplain of river Sypy in border of Panflynska research station NNTS "The Institute of agriculture NAAS". The power of peat layer is 238-252sm with high level of decomposition more than 70%. Contents in soil the nitrate azote in border 72-267mg/100g dry soil, the reaction of soil substance pH7,4-7,8,

The sown area is 36 m², account – 25m². Repeating of research – four times. For sowing was used the corn hybrid Ostrich CB. Seeding the grain was made by wide rows way (0,7m) with seeding norm 80000 piece/ha and depth wrapping 4-5sm.

Among the way of main soil cultivation was used the classical plowing on 25-27sm minimal cultivation on 10-12sm and zero cultivation with herbicide continuous action. The manure was brought in according to research scheme. The mineral manures in granule form was brought in under presowing cultivation. Liquid organic and concentrate chelated manures on leaf surface in period vegetation of corn started from phase 3-4 leaves with interval in 10 days three time per vegetation. Field research was conducted in accordance with methodical recommendations on conducting research on reclaimed land [6] and methodology of the field experiment [7].

The weather condition in the period of leading the research have unstable character with declination from average perennial index. The annual vegetation's temperature was in 2010 – 15,6 °C, which replies norm, whereas in 2012 – 17,1 °C with declination on 1,6 °C and in 2013 – 17,3 °C with overrun the norm on 1,8 °C. Providing the atmosphere precipitation was in 2011 – 558,2 mm, 367 mm – 2012, and in 2013 – 381,7 mm for vegetation.

The regulation of water regime was carried out by the dried-wetting network. The annual standing of the soil's water from April to October was within the limits 71 cm from the soil surface, and during the vegetation period of corn from 59 to 127 cm. Herewith the humidity of soil with the root layer ranged from 65-70% from full moisture. Using the different types of cultivation of soil had the different influence on the formation of the humidity. So for the plowing and zero humidity tilling in 0-10 cm layer had a difference of 10%, and in the 0-30 cm layer to around 2-5%.

For the improvement of agronomic index the matted soil and creation of the favorable conditions for the corn's development, the main cultivation was made in the August – September after 3-4 slopes of perennial grass. The cultivation of the layer by using the system of zero soil cultivation was made with the herbicides of continuous action on the base of glyphosate. In the case of dense covering of the peat by the sod remnants germination of weeds is not possible, because the necessity for herbicides can appear only during the planting or after emergence of culture.

By the system of cultivation with the mechanical destroying of turf was used the double milling with interval 10-14 days. In the spring period with the reducing of soil's water to 50-60sm from the soil surface was created the conditions for conduction the minimal cultivation on 10-12sm and the plowing on the depth of 25-27sm. Conduction the sowing the corn is possible mostly in second decade of the May, in this period the soil's water reduces to 60-80 sm, and soil is warmed up to 10-12 °C.

Results and discussion. The researches, which was conducted on the old-plowed peat soils, were set that the main influence on the forming grain's yield of corn had mineral manures, as evidence different intensity of plant's development with different variants of fertilization. On the controlled variants without adding the mineral manures, already in the early stages of development were noticed the features of potassium starvation but outward signs of potassium deficiency plants are significantly behind in growth and development of plants fertilized with potassium against the main cultivation of soils (Fig. 1).

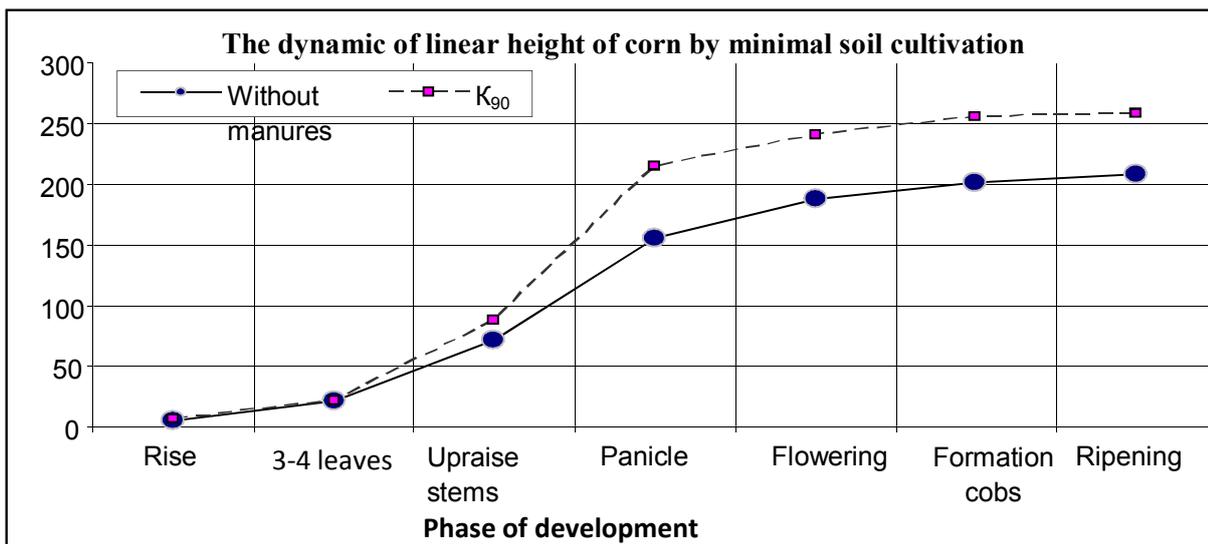
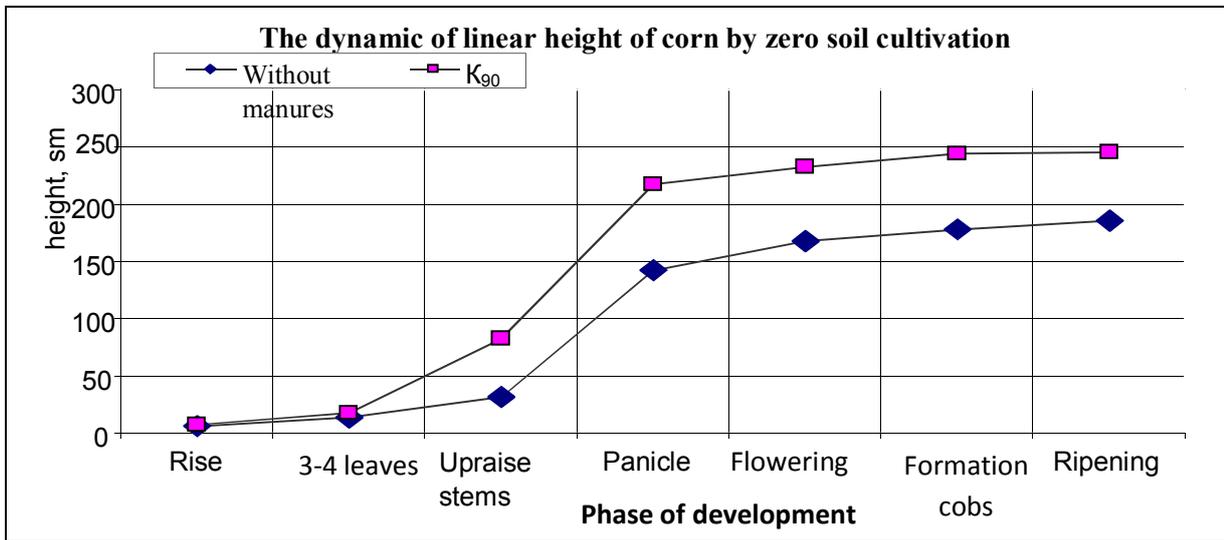


Fig. 1 Influence of potash fertilizers on strengthening the growth process of corn

By insufficient potash fertilizers the young plants was in stress condition, lag in growth and had yellow-green color of the leaves with features of drying the ends of the leaves and had low stability to changes of weather. With the development of the plants was noticeable shortening of the length of the internodes at them the same amount and other backgrounds fertilization. Such watching talk us about essential influence of potash on productivity of corn. Introduction of potash fertilizers in the soil under the Pre-cultivation contributed to the improvement of power plants. Height of corn's sowing, making potash for different soil tillage systems was within the limits 250-260 cm, whereas in areas without manures it barely reaches 2 m and in arid 2012 did not exceed 1,5 m. Using in the fertilizer's system the liquid organic manures gumisol and chelate manure reacom by the leaf's surface hadn't the expected influence on improving the growth function and reproductive organs formation of corn and were in the same rhythm as in the control variants. Whereas providing of corn seedling from the first stage of ontogenesis by the suitable forms of feeding using the mineral manures under pre-sowing cultivation, was promoted the intensive development comparatively with plants from controlled areas and areas with cultivation by liquid manures. As a consequence of forming the crops high for control on 18-20%. But except of mineral manures on growth and development of the plants the influence had the main soil cultivation (Fig. 2).

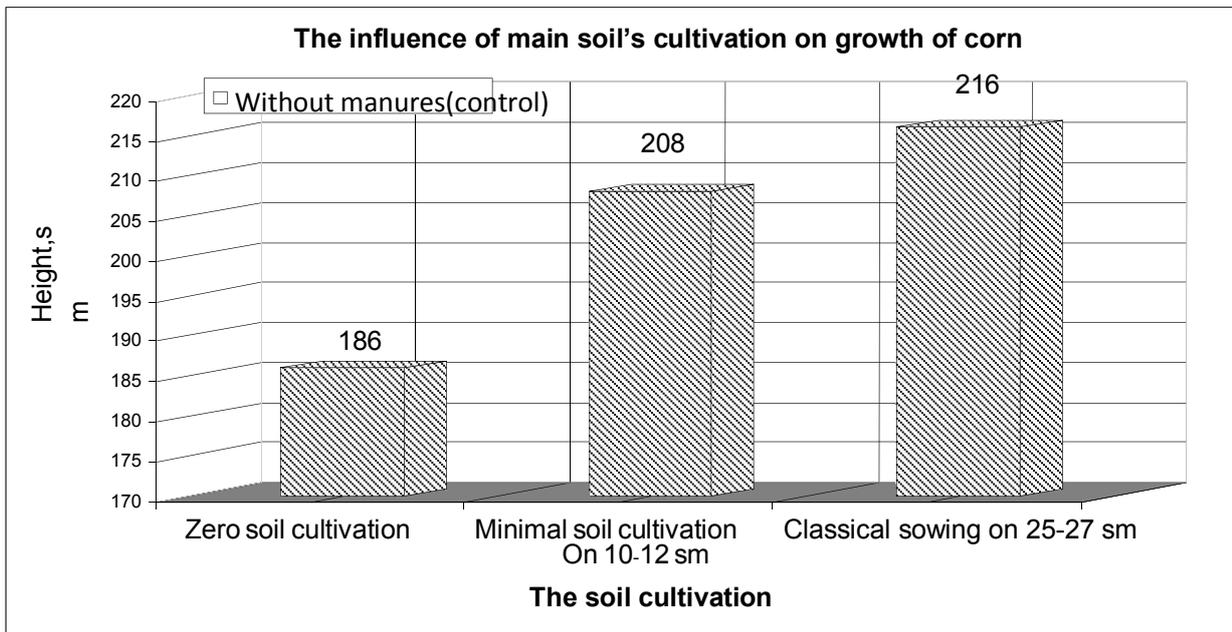


Fig. 2. The influence of main soil cultivation on change of height crops of corn

The worth development of plants was watched by zero soil cultivation annual 186sm, conduction mechanical cultivation of soil under corn promoted improvement of growth process of corn and provided the improvement of plant's height from zero cultivation on 22-30sm.

In the process of plant's development without manures and processed the liquid manures reacom and gumisol by different system of soil cultivation accumulated on 28-35% low of vegetation's mass, together with what on this variants watched the lowering the mass 1000seeds.(Fig.2) the lowest mass of the grain got by zero soil's cultivation which was on control and with cultivation by liquid manures was 241-249 gr, and by minimal cultivation and plowing the grain's mass elevated to 274-288 gr. Introduction the potash under corn elevated the grain's mass on 21-29 gr. The highest grain's mass was formed the plants by full mineral and phosphorus-potassium fertilization – 270-307 gr, by zero soil cultivation on 315-328 gr, by minimal cultivation and plowing.

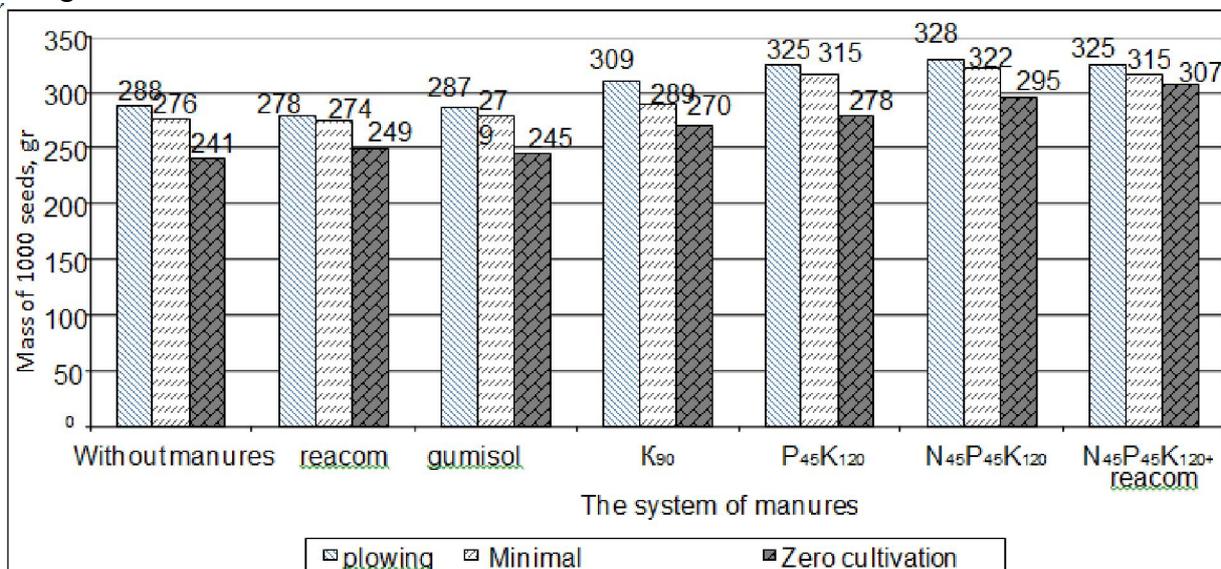


Fig. 3 Change the mass of 1000 seeds of corn depending on agro-technical actions

Formation of the different height of corn on a background of different basic soil layer of perennial grasses and fertilizers indication and different yield corn. By applying autumn plowing

provided increasing corn yields relative to the zero cultivation on 15 % and 4% of the minimum cultivation. During the period of research on drained peat lands corn yield varied on background different factors of influence and was in the range of 4 to 11 t/ha while the accumulation of vegetative mass ranged from 30 to 100 t/ha at a humidity of mass 74 -77 % (Table. 1). The lowest yield values obtained for the control (without fertilization) and by cultivation the plants with liquid fertilizer that under zero cultivation was 4,3-4,5 t/ha, with a minimum 5-5,1 t/ha and by plowing 5,7-6 t/ha.

Introduction of potash fertilizers under corn crops at a dose of K_{90} promoted growth 1,1-1,5 t/ha of grain relative to controls and provided receipt of 5,8-7,1 t/ha. A more balanced feeding of the plant was provided by the combined of potash and phosphate fertilizers with nitrogen. So by introduction $P_{45}K_{120}$ corn yield reached 7,3-9,5 t/ha, and for $N_{45}P_{45}K_{120}$ - 7,9-10,8 t/ha. The highest grain yield got by carrying out the classic plowing at 25-27 sm on a background of complete mineral fertilization ($N_{45}P_{45}K_{120}$) -10,8 t/ha of grain.

Table 1

Productivity the crops of corn depending on fertilization and tillage, average 2011-2013, t/ha

Fertilization	Zero cultivation (introduction the herbicide)	Minimal cultivation on 10-12 sm	The classical plowing on 25-27 sm
Without manures (control)	4,3	5,1	6,0
reacom	4,5	5,1	5,7
gumisol	4,5	5,0	5,8
K_{90}	5,8	6,2	7,1
$P_{45}K_{120}$	7,3	8,4	9,5
$N_{45}P_{45}K_{120}$	7,9	9,5	10,8

*HIP*₀₅ –by years 0,20
 - by cultivation 0,24
 - by fertilization 0,37

Except the above factors on corn's productivity affect and weather conditions that accompanied the whole vegetation season. Along with increased of water providing of peat soils, due to lack of rainfall may be reducing energy use efficiency of mineral fertilizers has been a manifest in 2012 and was the cause of shortfall 0,4-1,5 t/ha of grain. In addition, an important factor in obtaining high-quality grain on drained peat lands play humidity and soil during crop maturation, after exceeding the limit values can be the cause of poor quality threshing crops. During the period of research in grain moisture technical maturity varied widely from 24% in the absence of intense rainfall and soil moisture retention not exceeding 65% of the full moisture capacity of up to 32% under conditions of intense loss of rainfall and humidity root layer at the level of 72-80% of full capacity. During the later sowing of corn than on rainfed lands ripening grain on peat lands comes to the end of September beginning of October with a possible period of increased intensity of rainfall loss and the use of hybrids earlier ripening is possible to avoid such risks.

Such way the successful growing of the corn on drained peat lands of humid zones on the layer of perennial is conditioned by accessibility of nutrients from first stages of plant's development, a number of which mostly was determined by introduction of mineral manures and releasing from peat by mechanical development of layer sod. A lack of batteries during germination of seeds cause the plant's lagging in height and development and more later earning of nutrients to plants is not influenced on yield's growth how vegetation mass so and grain.

That's why for the corn growing on the drained peat soils on the layer of perennial grass first of all you should provide the young seedlings enough number of nutrients regardless of chosen system of main soil's cultivation.

Conclusions.

1. The limited factor in forming the productivity of corn on peat lands is acted the potash. Providing the soil of acceptable forms of batteries by induction of mineral manures, a part of potash, is given the growth of yield depend on control 1,1-1,5t/ga on grain.
2. Together with mineral feeding of plants the important things is the main preparing of soil under corn plowing, conduct which in the autumn series provides improved agronomically important features of peat to develop corn plants and the formation of its productivity.
3. In the forming of quality yield and it's threshing the important role plays using the early hybrids of new generation with using of which you can get the high yields of corn on drained soils with low humidity of grain's mass and by the modern setting of drying and technology of saving and concerning grain have the high payback of production.

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Анотація

Особенности формирования продуктивности кукурудзы на торфовых грунтах Лесостепи Украины

У статті показана ефективність основного обробітку ґрунту і добрив у формуванні продуктивності кукурудзи на осушуваних органічних ґрунтах Лесостепу. Наведені результати зміни вологості ґрунту залежно від основного обробітку пласта багаторічних трав. Висвітлено вплив фону удобрення та основного обробітку ґрунту на зміну елементів продуктивності кукурудзи, зокрема висоти рослин, довжини качанів, маси 1000 насінин та урожайності зерна.

Ключові слова: *осушені ґрунти, торфовища, основний обробіток ґрунту, добрива, кукурудза, продуктивність*

Аннотация

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Особенности формирования продуктивности кукурузы на торфяных почвах Лесостепи Украины

В статье показана роль и эффективность основной обработки почвы и удобрений в формировании продуктивности кукурузы на осушаемых почвах Лесостепи Украины. Приведены результаты изменения влажности почвы в зависимости от основной обработки пласта многолетних трав. Освещено роль влияния фона удобрения и обработки почвы на смену элементов продуктивности кукурузы, в частности высоты растений, длины початков, массы 1000 семян и урожайности зерна.

Ключевые слова: осушаемые почвы, торфяники, основная обработка почвы, удобрения, кукуруза, производительность