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THE DIFFERENT CULTIVATION METHODS EFFECT ON THE SOIL AGRO-PHYSICAL PROPERTIES AND WATER PROVIDING DURING AUTUMN SOWING

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The main aim of the research is to increase the autumn sowing crop, enrich the agro-physical properties of soil, improve water providing and decrease the cost price of producing goods in NKR foothills with light brown loamy and carbon soil of average strength by means of machining cultivation reduction. The use of stepped cultivation in topsoil (0-20cm) decreased soil thickness compared with plowing on about 6,7 % . This method of cultivation improved also the soil porosity and water-permeability. If in the arable land during the tillage (0-20cm) porosity is about 41,35%, water-permeability is 3,28mm/min, in under topsoil(20-30cm)is 38,7%and 2,25mm/min, in stepped topsoil cultivation conditions the same indices are 54,7%, 4,17mm/min and 51,2%, 3,45mm/min accordingly.The reducing of intensity of topsoil cultivation use and keeping soil surface leftover stubble are favorable not only for topsoil but also for low topsoil vegetation in all the stages and assist to increase the storage of moisture on average about 2,74%. On this case the crop yield of winter wheat comparable with usual plowing increased on 2,9 c/ha, and the production cost price decreased on 21,2%

***Key words**: soil cultivation, agro-physical properties, water providing, crop yield, expenses reduction.*

Introduction

In order to get high and stable crop with low cost in complicated ecological conditions it is necessary to invest newest sorts to as new agro means for keeping land productivity, growth one of which the machine cultivation is. By changing physical, chemical and biological processing course the machine cultivat.ion becomes more influential for land productivity than all the other technological processes. In the technological structure of crop cultivation 50% of outlay is for cultivation operations. Most researchers agree that depending on land cultivation decrease the restoration conditions are improved. Besides the energy costs are reduced and it not only makes cheaper the technologies but also increases the stability of soil and environment [1-3].

The level of land cultivation is zero technology, the use of which despite improving the productivity of certain lands, needs to be equipped with high technical provision and intensive chemicalisation.

This circumstance limits the wide use of direct sowing. Besides there are other obstacle factors, land and climate conditions, the lack of field research and so on [4].

In many works there are data about the advantages of complex and minimal cultivation structure, especially in the lands with lack of moisture and in the lands which need landfall such us in the wheat sowing areas of NKR, where the annual average downfalls are 250-420mm and the most part of arable land is on the different slopes. In above mentioned areas during the vegetative growth there are 30-35% of downfall (from annual amount of downfall). With such distribution of atmosphere downfall the crop yield generally depends on autumn and winter moisture supplies in soil. It is necessary to solve the problem of landfall with the problem of water supply and drought in complex, by use of minimal soil protection technology and special equipment.

During the researches it has been estimated that the most productive lands are the lands which have been cultivated gradually, consisted of upper wholly mold surface layer and bottom line deeply mold level. Creating such profile doesn`t demand much expense, the ledged bottom of cultivated

topsoil prevents the flow of ingrained water into the soil, mold lines provide good water-permeability in deeply rooted layers and the productive prevention of moisture vaporization is reached by means of mulching of cultivated plots of land. The mulch layer protects also from downfall and from washing, raindrops and sun radiation, promotes the snow accumulation and decreases of the top soil freezing [5].

That`s why the creation and maintenance of the best topsoil structure by means of different cultivation systems is the urgent issue of modern intensive farming. But the dynamics earth processing and their effect on its productivity during cultivation demand of the regular research of the changes in agro-physical indexes [6] and this work is dedicated to it.

Conflict settings

The aim of the research is to find out the effect of different methods of cultivation in NKR Askeran district light brown loamy soil with carbon average strength (pH=7.5), with humus ingredient` 2.5-3.0%, on such agro physical properties of soil, from which the water supply and preventing of landfall depend on. In short rotation of clean fallow-winter crop-winter barley (2012-2015) there were conducted some field and laboratory researches, and compared the data of storey topsail cultivation due to traditional methods.

Yearly tillage was done in 20-22cm depth, using PLN-4-35 plough, and the storey top soil cultivation with grape PRVM-3 kind of moldering machine, which had two recovered moldering toes, which could mold the soil with 7-12sm depth, and before it the distance between the cutting particles as 100cm, the width-10cm and the depth-25-35cm. There were studied the agro physic properties of winter crop, its water supply and grain crop. The examples of soil were taken during two periods: in the beginning and in the end of plant growth according to topsoil (0-10, 10-20, 20-30cm) twice.

During field and laboratory researches there were used the fallowing methods and methodology: the volume-mass method, water supply by Khachinsky method, soil moisture by weight method, the crop yield by widely spread method of B.A. Dospekhov [7, 8].

Research results

It has been established during field experiments that the different methods (in fallow grain sowing circulation) as in topsoil (0-20sm) so in low topsoil provide not the same soil structure. Stepped topsoil cultivation provides more volume, porosity, water–permeability compare with traditional plowing. In this case the change in topsoil, 1.21g/cm³ in low topsoil, and in case of tillage-accordingly 1.19 and 1.25g/cm³ (Table 1).

It can be supposed that by storey topsoil cultivation the decrease of thickness in topsoil upper layer is gained due to down fall water in deep mold holes, temperature changes, which make soil shorten and widen [5].

As you can see from the data in the same chart the porosity has the best data as in storey topsoil, so in traditional tillage, but it was higher in case of storey topsoil cultivation as in upper (0-10cm) topsoil, so in low (20-30cm) topsoil and it was more in 132 times. It can be explained also by changing the use of plough and creating due to its tools, pores in soil and using of plow sole, which effects on soil fauna, especially on the speed of migration of worms to food sources.

The good water-permeability of soil is favorable for its normal air conditioning and biological activity.

Soil water-permeability and wetness can be affected by agro-machines with use of physical properties long-lasting improving method .During our experiment the data f soil water-permeability indicate that stepped plowing cultivation compared with tillage, in case of winter crop sowing led to increasing of water-permeability as in arable and topsoil, so in under topsoil.

Table 1

The different cultivation methods effect on the soil agro physical properties during autumn sowing vegetation (2012-2015 on average)

Cultivation method	Layer Cm	Thickness g/cm³	Porosity %	Water permeability Mm/min
Moldboard	0-10	1.17	42.1	3.91
Plowing	10-20	1.21	40.6	2.65
20-22cm	20-30	1.5	38.7	2.25
	0-30	1.21	40.5	2.95
LID_{05} 0-30cm		0.08	1.03	2.15
Stepped	0-10	1.08	55.8	4.26
cultivation	10-20	1.15	53.6	4.09
	20-30	1.21	51.2	3.45
	0-30	1.15	53.5	3.93
LID_{05} 0-30cm		0.07	1.05	2.12

In topsoil it excelled in 0,92m/min or 28.2% compared with plowing in under topsoil it excelled in 1.22mm/min or 53.3% first it is conditioned by penetration of water deep in the soil through loosened clefts and due to its abnormal property making soil self loosened and on the other hand by activation of zoo fauna, especially of earth worms, which not only favor the low topsoil biological loosening improving its structure, but also by creating numerous passes provide the soil profile transparency in 1m depth.

During the autumn sowing vegetation the least stock in its different layers was observed after traditional plowing and composed 19.25-9.56%, and the most in case of stepped plowing composed 22.97-12.11% (Table 2).

Table 2

Soil moisture reserve during vegetation depended on cultivation methods (2012-2015 on average)

Cultivation method	Layer Cm	Soil moisture according to layer, %		
		In the beginning of vegetation	During spike forming	Before harvest
Moldboard	0-10	15.12	14.45	8.25
Plowing	10-20	19.48	18.32	9.12
20-22cm	20-30	23.14	21.63	11.30
	0-30	19.25	18.13	9.56
LID_{05} 0-30 cm		1.03	1.12	1.08
Stepped	0-10	19.18	18.13	10.82
Cultivation	10-20	24.46	20.61	12.40
	20-30	25.28	21.43	13.11
	0-30	22.97	20.06	12.11
LID_{05} 0-30cm		1.14	1.11	1.04

In case of stepped cultivation in spring the high content of moisture dampness was kept during the whole vegetation period and before harvest excelled plowing in 2.55%. It is explained by the fact that in case of stepped cultivation the leftover stubble of soil surface holds the soil crusting surface, and due to it water-permeability and ventilation improve, moisture improves and makes soil loose and in soil upper layer the quantity of organic substances increases. In soil which was mold without moldboard plowing the plough sole disappears. These factors favor the soil thickness decrease fertility and crop yield increase.

The crop yield of autumn sowing grain in our experiment (for 4 years average data) in case of stepped cultivation composed 18.8c/ha, which excelled the traditional plowing in 18.2% (Table 3).

Table 3

Wheat grain crop yield according to experiment varieties (2012-2015)

Variant	Harvest c/ha					Deviation from spotter	
	2012	2013	2014	2015		c/ha	%
Moldboard plowing 20-22cm	26.8	23.4	24.7	28.6	25.9	-	-
Stepped cultivation	28.2	27.6	27.9	31.3	28.8	2.9	18.2
AET $_{05}$ 0-30cm	1.2	0.6	1.1	0.8	1.4	-	-

Conclusion

So comparison of the uninterrupted moldboard plowing cultivation in depth of 20-22cm and stepped cultivation in light brown loamy and carbon soil for autumn sowing (as its main cultivation) showed that the wingless cultivation with preserving surface plant leftover favors the improving of as topsoil (0-20cm) so of low topsoil (20-30cm) agro physical properties, water supply and crop yield increasing and expenses reduction in 21.2%.

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ՄՇԱԿՄԱՆ ՏԱՐԲԵՐ ՁԵՎԵՐԻ ԱԶԴԵՑՈՒԹՅՈՒՆԸ ՀՈՂԻ ԱԳՐՈՖԻԶԻԿԱԿԱՆ ՀԱՏԿՈՒԹՅՈՒՆՆԵՐԻ ԵՎ ՋՐԱՊԱՀՈՎՎԱԾՈՒԹՅԱՆ ՎՐԱ՝ ԱՇՆԱՆԱՑԱՆ ՑՈՐԵՆԻ ՑԱՆՔԵՐՈՒՄ

Ս.Բ. Գալստյան
Շուշիի տեխնոլոգիական համալսարան

Հետազոտության նպատակն է ԼՂՀ նախալեռնային գոտու բաց շագանակագույն կավավազային, կարբոնատային միջակ հզորությամբ հողային պայմաններում՝ մեխանիկական մշակման նվազեցման ճանապարհով հասնել հողի ագրոֆիզիկական հատկությունների, ջրապահովվածության օպտիմալացման, աշնանացան ցորենի բերքատվության բարձրացման և արտադրվող արտադրանքի ինքնարժեքի իջեցման: Հարկաշերտավոր մշակման կիրառումը վարելաշերտում (0-20սմ) հողի խտությունը առի շրջմամբ վարի համեմատությամբ նվազեցրել է 6,7%, ենթավարելաշերտում՝ (20-30սմ) 4,9%: Հարկաշերտավոր մշակումը բարելավել է նաև հողի ծակոտկենությունն ու ջրաթափանցությունը: Եթե առի շրջմամբ վարի դեպքում վարելաշերտում ծակոտկենությունը միջին հաշվով կազմել է 41,35%, ջրաթափանցությունը՝ 3,28մմ/րոպ, ենթավարելաշերտում՝ 38,7% և 2,25մմ/րոպ, ապա հարկաշերտավոր մշակման դեպքում այդ նույն ցուցանիշները համապատասխանաբար կազմել են՝ 54,7%; 4,17 մմ/րոպ և 51,2%; 3,45 մմ/րոպ:

Բանալի բառեր: հողի մշակում, ագրոֆիզիկական հատկություններ, ջրապահովվածություն, բերքատվություն, ծախսերի կրճատում:

ВЛИЯНИЕ РАЗЛИЧНЫХ ФОРМ ОБРАБОТКИ ПОЧВЫ НА АГРОФИЗИЧЕСКИЕ ПРИЗНАКИ И ВОДООБЕСПЕЧЕННОСТЬ В ПОСЕВАХ ОЗИМОЙ ПШЕНИЦЫ

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Цель исследования -достижение оптимизации агрофизических признаков и водообеспечение почвы, повышения урожайности озимой пшеницы и снижения себестоимости производимой продукции путем сокращения ее механической обработки в условиях средней мощности светло-коричневой, суглинистой и карбонатной почвы в предгорных зонах НКР. Применение ступенчато- слойной обработки по сравнению с отвальной вспашкой сократило плотность почвы в пахотном слое на 6.7%, а в подпочвенном-на 4.9%. Ступенчато-слойная обработка улучшила так же пористость почвы и ее водопроницаемость. Если при отвальной вспашке пористость пахотного слоя, в среднем составляет 41.35%, водопроницаемость 3.28мм/мин, а пористость подпочвенного слоя 38.7% с водопроницаемость - 2.25мм/мин, то при ступенчатой обработке те же показатели, соответственно составляют 54.7%, 4.17мм/мин и 51.2%, 3.45мм/мин.

Применение ступенчато-слойной обработки и сокращение ее интенсивности, а так же сохранение стерневых отходов поверхности почвы привели как в пахотном, так и в подпочвенном слое к

увеличению запасов влажности, в среднем до 2.74% на всех этапах вегетации. Этот метод обработки увеличивает урожайность озимой пшеницы по сравнению с обыкновенной вспашкой на 2.8 ц/га, и снижает себестоимость продукции на 21.2%.

Ключевые слова: обработка почвы, агрофизические признаки, водообеспеченность, продуктивность, сокращение затратов.