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Development Harvesting Method and Machine the Corn for Grain in Condition of Uzbekistan

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ABSTRACT. It is important to harvest the produced crop of the corn with low expenses in early periods and quality. Therefore, the researches were done that about earlier harvesting the corn for grain in the period waxy ripening of the corncob. It was defined that during the experiment the corn may be harvested in its waxy ripening period 10-16 days earlier than ripening completely in condition of Uzbekistan. The corn harvester machine were developed for using this harvesting technique. Their experiment and testing showed that the technological process of these technical implements is practiced at degree of the demands. Thus the corn is harvested earlier, the general expenses are decreased too because the corn is threshed straightly without peeling the husks.

KEYWORDS. Corn harvesting machine, harvested earlier, corn types, early maturing, midseason maturing, late-season maturing, stalk, corncob, corn, yield, running quality indicators.

I. INTRODUCTION

In Uzbekistan this method is used in very few areas, because the stalk of the corn is used as coarse hay for cattle animals, also the vegetation period is long (120 days) and the corn that is seeded after wheat as repeatedly crop can not catch to dry well. Furthermore, only the grain part of the corn is harvested by this method, and the stalk part of the corn is strewed on to surface of the field as humus. And this causes not to be harvested of the material that is used as coarse hay for cattle animals.

II. SIGNIFICANCE OF THE SYSTEM

It is important to harvest the produced crop of the corn with low expenses in early periods and quality. Therefore, the researches were done that about earlier harvesting the corn for grain in the period waxy ripening of the corncob. The study of literature survey is presented in section III, methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and conclusion

III. LITERATURE SURVEY

It is being paid a lot of attention to develop of cattle and poultry branches for increasing of quantity of the meat, milk and egg productions and providing with meat, milk and egg the population at enough degree in Uzbekistan. Developing of cattle and poultry branches depends on providing with their forage productions straightly. Because when the number of cattle livestock and poultry increases, the requirement rises for forage and foodstuffs too. The grain and silo of corn are always used as foodstuff in countries of the world where cattle and poultry branches are developed [1]. Therefore it is being organized to grow the corn as main and repeatedly plant in Uzbekistan too. It is one of the most important tasks to harvest the crop of the ripened corn with few expenses but with high quality.

According to experience of the world the methods which are as grain form or as pod-corn form are used to harvest the corn for grain [2, 3].

IV. METHODOLOGY

The corn stalks are reaped by the combine-harvesters for cropping the corn for grain, the corncobs are picked from their stalks and they are threshed by the combine-thresher, the grain is separated. This method is very thrifty, but for this method the corn has to be ripened completely, its moisture should be between 22-26 per cent [4].

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Nowadays some new harvesting methods are being researched for settling these defects of the above mentioned methods [3, 5, 6]. However, in Uzbekistan that harvesting methods can not be used because of that expense of energy is high and the machines that are used for doing these operations are very expensive.

The corn is harvested as formed corncob by two forms, namely husks are peeled from their pod-corns or without peeling the husks. This method is done by the help corn harvester machines or combines. At first the stalks of the corn are reaped, pod-corn is stripped and stalks are cut, silo is unloaded on to transport that is moving in the side of combine. And corns are peeled from their husks or they are unloaded without being peeled on to trailer that is joined to the transport. This method is much more advantage than others in Uzbekistan because the grain of the corn and also its stalks are harvested and pod-corn might be harvested when its moisture is 35-40 per cent.

Therefore, the researches were done on earlier harvesting the corn crop as pod-corn form. At first it was explored for studying about ripening of the corn crop.

V. EXPERIMENTAL RESULTS

The result of the experiment is showing that, the late-ripening corn that harvested in its waxy ripened period dries for 18-20 days, when early-ripening corn is dried in natural condition it is dried for 14-15 days and moisture decreases from 18 percent, it can be ready for threshing.

According to those researches the corn-harvester machine that harvests the corn crop in early periods as pod-corn form was created and also corn-sheller which can thresh the pod-corn, separate the threshed grain was created.

The created corn-harvester machine were tested for determining their work-quality efficiency. That time the corn-harvester machine was tested and researched for defining its work-quality efficiency with early-ripening, middle-ripening and late-ripening sorts of the corn. The agro-view characteristic that was in experimented field is illustrated in table 1.

Table 1. Indicators of the corn in the experimental field

№	Name of the indicators	Values of the indicators		
1	Sort of the corn	early-ripening	middle-ripening	late-ripening
2	Number of the stalk, piece/l.m	6,8	9,4	6,7
3	Height of the stalks, sm - average M_{av}	168,2	180,6	252,1
4	Diameter of the stalks, mm - average M_{av}	12,5	15,5	20,8
5	Diameter of the corncobs, mm	35,5	39,5	39,8
6	Fertility, t/ha - corncob - stalk	 3,0 3,6	 3,5 4,4	 5,0 10,1
7	Moisture, % - stalk - corncob - grain	 17,2 22,6 16,3	 17,4 23,8 16,4	 26,8 31,3 26,2

It is seen that from data that in the table, in the field where experiment was done there is difference between the size-mass indicators of each other according to their sorts. It is seen that the moisture of the early-ripening and middle-ripening is lower 1,5 times than late-ripening.

At first the machine was used with early-ripening sort of the corn. During this experiment the work-speed of the tractor that was joined to the machine was 1,1 m/s, the power take-off shaft of the tractor was used at its rotation number 1000 rpm. After harvesting the corn with machine when indicators were analyzed, it was determined that the reaping-height was average 30,6sm, the harvesting efficiency of the corncob was 96,8 per cent, the quantity of the leaf-stalk among corncob was 3,6 per cent, work-efficiency was 1,5-1,8 ton in one hour (table 2)

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Table 2. Indicators of the corn harvester machine

№	The name of the indicators	The sorts of the corn		
		early-ripening	middle-ripening	late-ripening
1	Reaping-height, sm	30,6	30,8	32,0
2	Harvesting efficiency of the corncob, %	96,8	97,4	98,2
3	The quantity of the leaf-stalk among corncob, %	3,6	3,4	2,1
4	Work-efficiency, t/hour (just harvesting the corncob)	1,5-1,8	2,1-2,4	2,5-3,0

The middle-ripening sort of the corn was harvested by the machine too as the same work-regime that was written in above paragraph. And it was determined that the reaping-height was average 30,8 sm, the harvesting efficiency of the corncob was 97,4 per cent, the quantity of the leaf-stalk among corncob was 3,4 per cent, work-efficiency was 2,1-2,4 ton in one hour.

When the early-ripening sort of the corn was harvested by the corn-harvester machine, its work-velocity was changed to 0,8 m/s. Because, when machine worked at 1,1 m/s work-velocity, the machine could not work because the crop of the corn was thick, higher fertile and therefore its worker-mechanisms were plugged with stalks repeatedly. When work-velocity of the harvester-machine was 0,8 m/s, it was determined that the reaping-height was 32,0 sm, the harvesting efficiency of the corncob was 98,2 per cent, the quantity of the leaf-stalk among corncob was 2,1 per cent, and work-efficiency was 2,5-3,0 ton in one hour.

The experiments showed that, when the fertileness of the corn is high, the work-efficiency of the machine increases too, we can see this situation in following results when the early-ripening corn was harvested fertileness was 3,0 t/hectare, therefore work-efficiency of the machine was 1,5-1,8 t/hour, when the middle-ripening corn was harvested fertileness was 3,5 t/hectare, therefore work-efficiency of the machine was 2,1-2,4 t/hour, and when the late-ripening corn was harvested, fertileness was 5,0 t/hectare, therefore work-efficiency of the machine was 2,5-3,0 t/hour,

When early-ripening and middle-ripening sorts of the corn were harvested, their moisture was lower (17,2-17,4 %). So, the quantity of the leaf-stalk among harvested corncob was equal to 3,6 % and 3,4 % respectively, when late-ripening corn was harvested, its moisture was higher (26,8 %). Therefore, the quantity of the leaf-stalk among harvested corncob of the late-ripening corn was fewer and it was equal to 2,1 %.

VI. CONCLUSION AND FUTURE WORK

The results of the experiments showed that, the ripening period of the corn in condition of Uzbekistan from waxy ripening period until completely ripening period is 14-16 days for late-ripening corn, 10-12 days for early-ripening corn. The corncobs of the late-ripening corn that harvested in the waxy ripening period of the corn dry in 18-20 days, and the corncob of the early-ripening dry in 14-15 days and after falling down their moisture from 20 per cent, corncobs can be ready for threshing. The results of the experimental testing showed that, the corn harvester machine that was created to harvest pod-corn in waxy ripening period and corn sheller machine that was created for threshing pod-corn can do technological process at degree of the requirement. The corn is harvested earlier by this method, and also the corn harvesting expenses decrease because pod-corn is threshed straightly without peeling the husks.

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