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СОВРЕМЕННЫЕ ТЕНДЕНЦИИ РАЗВИТИЯ АГРАРНОГО КОМПЛЕКСА

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APPLYING FOR WIDE COVERAGE FOUR WHEEL MACHINE-TRACTOR AGGREGATE IN ROW-SPACING

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Abstract: in article are brought about to applying for aggregates including wide coverage agricultural machines and four wheel cotton-growing tractors in intertillage of cotton-growing. There are given results of experiments' about decreasing soil compaction when using these wide coverage four wheel machine-tractor aggregates.

Key words: aggregate, three wheel tractor, four wheel tractor, wide coverage agricultural machine, wheel track, work productivity.

Some of the specific requirements put on the energy facilities for that to growing the cotton with mechanized ways. These ways: raising of work productivity of tractors, providing energy resource-saving and manoeuvrability characters. In cotton growing is used on crop fields as maximum as possible. All of the chosen fields are sowed as much as possible. In these processes plants are squeezed when tractors turning at the end and at the start of the field including in various agricultural machines. Sometimes, cultivator tractors are limited to turn with barriers as trees, concrete cunettes, and watering system dams, irrigation ditches, watering trenches and etc. supplementary obstacles near the turning area. In cotton growing technology are not intended turning area for the machine-tractor aggregates to turn easily that for moving supplementary facilities at sewing, cultivation with fertilizing, and the other works.

The cotton plants damaging is occurred mainly in the turning area when it turn during at the end and at the start of the field's. Tractor driver is realized the turning

over the growing cotton plants. As the results, cotton plants are squeezed with tractor wheels in the turning area. Therefore, to the tractor is putting on demands to decrease the radius. Besides that, when tractor is intertilling, it must be turn from the turning wheel track lines of the tractor that were cultivated first.

For the purpose of decreasing the wheel tracks in the turning area that the Case-4240X cotton cultivator-tractor are unitized with the six row sowing-machine MPPE-6 and the cultivator KXO-5,4. And, then experiments are carried out of sowing-machine and cultivator in the cotton plant sowed field.

Using of the four wheel machine-tractor aggregate as compared to three wheel machine-tractor aggregate is exceeded of work productivity, reduced passages from the field and decreased wheel tracks on the field.

On purpose, to define a surface that plants are squeezed in the turning area, those are formed surface from the tractor wheels tracks would be imitated to the graph paper on a scale, and finally, surface of the wheels tracks would be defined way of using of the measure by planimeter from on a scale. If, the wheel tracks are putting on double quantity with each other, they might be consider one wheel track.

The squeezing level of crop plants is defined from the following formula

$$K = \frac{F_{w.tr.}}{F_{s.}} \cdot 100\%, \qquad (1)$$

herein $F_{w.tr.}$– wheel track, m^2, $F_{s.}$– full surface of turning area of the tractor to turn by 180^0, m^2.

The amount of squeezing crop plants when influence of tractor wheels in turning area is defined through measuring of formed by the wheels track of tractor in the area that sowing by machine in turning area. Herein, it is considered that when squeezed crop plants nests being fitted to the wheel tracks, and quantity is defined.

The losing level ($K_{\ddot{y}}$) of crop plants when squeezing by the wheels of tractor is defined through the following

$$K_{sq.} = \frac{N_n}{N_{\sum s}} \cdot 100\%, \qquad (2)$$

herein N_n – amount of nests under wheel track in turning area, piece;

$N_{\sum s}$ – total amount of nests in turning area, piece.

During the experiments in experimental ground with six row machine-tractor aggregates (sowing machine and cultivator) that soil solidity (table 1) and density (table 2) data are brought following tables [1].

Table 1. The soil solidity data during experiments, kPa

The soil layer	1	2	3	4	5	average value
0-5	0,28	0,39	0,36	0,16	0,38	0,314
5-10	1,12	0,62	0,18	0,48	0,73	0,626
10-15	1,18	1,63	0,87	1,65	1,44	1,354
15-20	2,87	2,05	1,24	2,09	1,58	1,966
20-25	3,67	2,17	2,57	1,88	-	2,573

Table 2. The soil density data during experiments, g/sm^3

The soil layer	1	2	3	average value
Density under wheel tracks until experiments, g/sm^3				
0-10	1,30	1,32	1,14	1,25
10-20	1,34	1,44	1,16	1,31
20-30	1,30	1,62	1,34	1,42
Density under wheel tracks after carried out experiment, g/sm^3				
0-10	1,81	1,62	1,64	1,68
10-20	1,93	1,76	1,68	1,80
20-30	1,95	1,83	1,74	1,85

The experiments are carried out different types of turning methods machine-tractor aggregates. These methods turn to are: I – to turn with open loop; II – to turn with half circle and not open loop; III – to turn with short way back and loop; IV – to

turn with long way back and loop. Inherently these results of experiments are chosen methods of which wheel tracks surface were small and plants would be squeezed a little in turning area, and shown on figure 1 and in table 3.

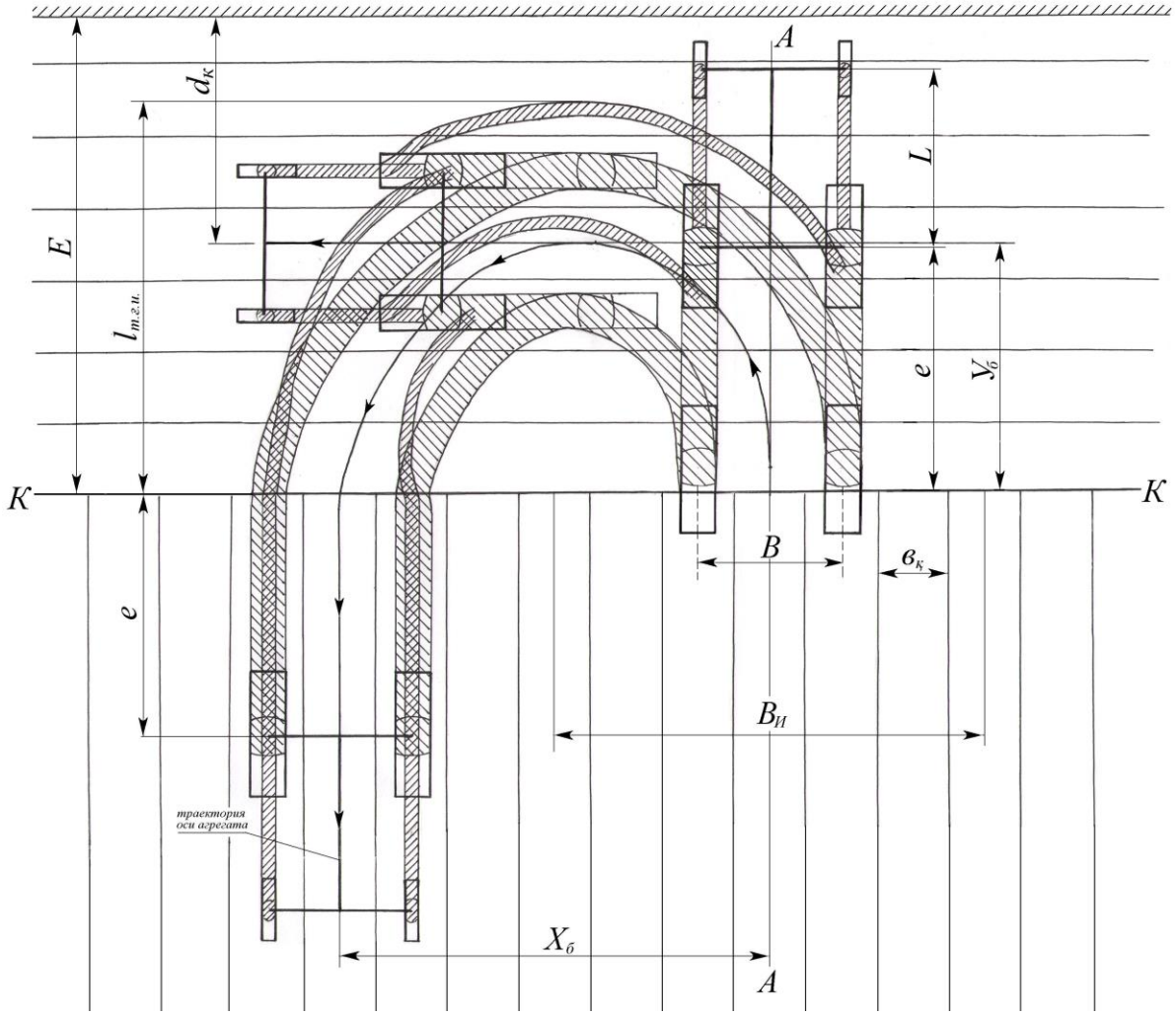

Figure 1. The tracks formed by a wheel of cultivator machine-tractor aggregate in turning area (wheel tracks surface is shown in hatch).

Table 3. Comparison to cultivation aggregates' of its index properties [1].

№	Names of indexes	Sym bol	The indexes' values of turning methods			
			I	II	III	IV
1	The width of turning area's at the end point of aggregate, m	*E*	6,80	6,05	5,92	5,97
2	The length of output routes of aggregate, m	*e*	3,00	3,00	3,00	3,00
3	Distance between the entrance and output	$X_б$	5,40	5,40	5,40	5,40

	line when aggregate's is moved by checking line in turning area, m					
4	Turning ordinate (maximum value), m	$У_б$	4,02	3,27	3,07	3,15
5	Length of kinematic moving trajectory of aggregate's in turning area, m.	$l_б$	23,60	15,50	18,75	28,00
6	Width of turning area's by border of outer wheel track, m.	$l_{т.г.и.}$	5,55	4,80	4,85	4,57
7	The square of turning area, m^2.	$F_{б.м.}$	59,94	51,84	52,38	49,41
8	Full surface of tracks formed by one turn in the turning area, m^2.	F_{sur}	25,75	21,95	18,02	26,80
9	The rate of squeezing from wheel in one turn in the turning area, %	K	43	42	34	54
10	The quantity of plant nests in the experimental part of turning area, piece	$N_{б.м.}$	72	72	72	72
11	The quantity of squeezing plant nests in turning area, $\frac{a\ piece}{\%}$	K_{pl}	$\frac{22}{31}$	$\frac{12}{17}$	$\frac{15}{21}$	$\frac{17}{24}$

Inherently carried out study results in the experimental field that fuel consumption is studied which of compounded machine-tractor aggregates with wide coverage sowing machine and cultivator. As four wheel tractor are used in which consisting of wide coverage aggregates. But, the three wheel tractor is aggregated with four row agricultural machine. It is used four wheel machine-tractor aggregates including of sowing machine MPPE-6 for sowing, fuel is spent to *g*=3,5 *l*/*hectare*, and it is used for intertillage from cultivator KXO-5,4, fuel is spent to *g*=3,6 *l*/*hectare*. Using of four wheel tractor instead of three wheel tractor, and give an opportunity to increase a width and a work productivity of machine-tractor aggregate's, consequently is being decreased of fuel consumption until 25 per cent [2,3].

As a result of experiments is chosen "turning with a short way back and loop" method in which being formed less track wheels and being less squeezed in turning

area. It’s occurred decreasing of the wheels tracks’ of aggregate including six row agricultural machines with four wheel tractor as compared to aggregate including four row agricultural machines with three wheel tractor 1,89 times for the one hectare area.

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