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In the Article prevedena Experimental plant, P pomoshchju kotoroj provodyatsya Studies work pneumatic mechanical vыsevayuscheho apparatus for ego accuracy of Execution major functions. Showing stroenye installation ee scheme and described principle ee work.

Pnevmomehanchnyy vыsevnoy apparatus,Experimental plant,tochnыy posev,Semen,posev,dozyrovanyya.

The paper presents experimental installation,by which conducted research of work pneumomechanical sowing apparatus on accuracy of performance its functions. Is shown the structure of its installation scheme and described principles of its operation.

Pneumomechanical sowing apparatus, experimental installation, exact crop, seed, seeding, dosage.

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ANALYSIS bandwidth Transport and technological KOMPLEKSUZ BEZBUNKERNYMY harvesters

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The method of analysis bandwidth harvesting and transport complex bezbunkernymy harvesters for forage crops to improve its parameters.

Throughput, bezbunkerni harvesters, transport tools, analysis methods, ways to improve.

Problem. The total throughput processing chain assembly-transport sector (hereinafter - ZTK), which includes harvesting combines (hereinafter - HCC) and vehicles (hereinafter - TC), defines and limits the first link. At the same time, the second link bandwidth can be significantly higher. If so, the chain is working at peak performance, but the capacity of the second level (a resource) remains partially unused. A significant difference in the second link bandwidth compared to the first - is the difference, which can reduce the decrease in the number of cars ZTK by changing certain parameters of rational processes.

To remove a significant difference of the second link bandwidth compared to the first means full utilization of all links, which enhances the efficiency of ZTK.

Analysis of recent research. Methods of analysis parameters harvesting and transport complex, designed for use in cereals handling technology shows ways to reduce the number of transport vehicles in the technology sector for specific economic efficiency [1, 2]. The criteria for selecting options ZTK in existing methods is the performance of its vehicles, the value of which is limited to their bandwidth. However, this technique does not takes into account the specific choice of alternatives quantitative composition of vehicles

during collection and transportation direct feed crops and potatoes when used bezbunkerni harvesters and performed direct transportation of products from harvesting.

The purpose of research. Pidvyschyty economic efficiency harvesting and transport process for forage crops for direct transport of goods by bezbunkernyh combines equality capacity of individual links in reducing turnover duration TC.

Research results. For harvesting green mass for silage, potatoes and sugar beets partially used bezbunkerni harvesters. During the harvesters move in the working area together with the vehicle (TOR) - tractor trailer or motor vehicle (ATZ) and loaded crop production. After filling the body of another vehicle, it vid'yizdzhaye at the receiving point, unloaded and returned to the combine. To exclude stops for vehicle combines fixed group, which in turn are loaded zbyrayemoyu products. Consider bandwidth traffic and analyze the composition ZTK.

Bandwidth ZTK - the highest number of vehicle that can be loaded from the combine production, transport and unload it at the reception point on time. It is the first link bandwidth "field - combine harvester (HCC)" processing chain that determines the largest number of vehicle that can be loaded collected by the estimated production fixed time of the day. The capacity of the first link based on a deterministic approach and under analytical relations determined by the number TK (units) per working day as

$$N_1 = INT\frac{m_K T_P}{\mathrm{T}_{ЦК}} = INT\frac{m_K T_P}{\mathrm{t}_K + t_X}, \text{ Ed. / R.d,} \qquad (1)$$

where $\mathrm{T}_{\mathrm{ЦК}} = \mathrm{t}_K + t_X$ - The duration of the operating cycle HCC, h .;

n Mean TC - TS filling body:

$$t_K = \frac{\omega_K \cdot d_B}{W_{KP}} = \frac{q \cdot \gamma}{W_{KP}}, \text{ H .;}$$

where T_P - The estimated fixed time of the day, hour .; ωK - capacity vehicle body, m3; dB - volume mass production, t / m3; W_{KP} - Combine productivity per hour of normal time, t / h; tX - duration of idle moves on turns, which accounts for 1 cycle of the combine (filling body TOR).

It depends on the ratio of working strokes φ Whose magnitude is defined as the ratio of the total length of the working stroke granule cells to the total length of the working and idle strokes. In the account of the assumption that the operating speed of HCC and its speed cornering same coefficient is given by:

$$\varphi = \frac{t_K}{t_K + t_X}. \quad (2)$$

Hence we obtain:

$$t_X = \frac{t_K(1-\varphi)}{\varphi}, \text{ H.} \quad (3)$$

The average value of the coefficient working stroke according to the literature [3] is φ = 0.9. With this in mind

$$t_X = 0,11 t_K \quad (4)$$

Based on equations (1) - (4) the capacity of first-level "field - HCC" complex is defined as:

$$N_1 = INT \frac{m_K T_{3M} K_{3M} \tau}{t_K + t_X} = INT \frac{m_K T_{3M} K_{3M} \tau \cdot W_{KP}}{1,11 q \cdot \gamma}, \text{ Ed. / R.d ,. (5)}$$

where m_K - Quantity (units) HCC working in the field; $\tau = \delta_{3M} \tau_Ц$ - Ratio of the change in time; δ_{3M} - Ratio of cyclic time shifts, which determines the amount of time the length of time changes in cyclic operation; accepted for producers harvesting the EU and the US δ_{3M} = 0.9 [4]; $\tau_Ц$ - Ratio of cyclic time shifts: $\tau_Ц = \varphi$.

The capacity of the second link "LC - TC" - is the largest number of vehicle that can be loaded will provide transportation of products combine to unloading it at the reception point and return to the HCC for the billing cycle time changes, and is defined as

$$N_2 = INT \frac{n_{TЗ} T_{РЦ}}{T_{ЦТЗ}} = INT \frac{n_{TЗ} T_{3M} K_{3M} \delta_{3M}}{1,23(\frac{q\,\gamma}{W_{KP}} + \frac{2 l_{ij}}{v_T} + t_{T.ВИВ})}, \text{ Ed. / R.d., (6)}$$

where the mall - estimated cycle time of the day, which depends on the organization of interaction of machines ZTK, $T_{РЦ} = \delta_{3M} T_{3M} K_{3M}$; q -

capacity vehicle; γ - Coefficient of static capacity utilization vehicle; $T_{ЦТЗ}$ - The duration of the operating cycle (turnover) TS [5] is defined as

$$T_{ЦТЗ} = 1,23(\frac{q\ \gamma}{W_{KP}} + \frac{2l_{ij}}{v_T} + t_{TBИВ}) \text{ , H .;} \quad (7)$$

$t_{Т.ВИВ}$ - length of stay in the vehicle unloading point, depending on the level of mechanization and Works; lij - distance transport grain from the field (and point) at the point of discharge (item j); v_T Km / h - the average technical speed car on the way from the field to the floor.

Number of vehicle for transportation of goods defined as:

$$n_{TЗ} = CEILING\frac{m_K T_{ЦТЗ}}{T_{ЦК}} \text{ , Ed.} \quad (8)$$

Analysis bandwidth - a comparison of the capacity of the first and second parts, the following selection and analysis of alternatives, allowing to overcome the possible significant difference between their values. The analytical dependence and experimental data allow to calculate the value of rational capacity of individual units ZTK and if necessary improve its rational structure.

A necessary condition for effective work ZTK is the condition at which the capacity of first-level "field - LC" is not inhibited by the second level displayed by the following expression:

$$N_1 \le N_2 . \quad (9)$$

Consider the option when the bandwidth of the second link "LC - TC" significantly exceeds the capacity of the first team. Let us analyze the possibility of reducing the bandwidth of the second level to the maximum possible - the first link bandwidth by reducing the length of cyclic time on vehicle transportation products. To take the analysis of boundary conditions (in the direction of reduction) for bandwidth as the second link

$$N_2^{'} = N_1 , \quad (10)$$

where $N_2^{'}$ - The capacity of the second link with the reduced number of vehicle to nTZ1 nTZ = -1 and a corresponding reduction in the length of time to cyclic $T_{ЦТЗ1}$:

$$T_{ЦТЗ1} = \frac{n_{TЗ1} T_{РЦ}}{N_1} \text{ , H.} \quad (11)$$

It is necessary to reduce the length of vehicle traffic will be defined as:

$$\Delta t = T_{ЦТЗ} - T_{ЦТЗ1} \text{ , H.} \quad (12)$$

This reduction is achieved by reducing the length of vehicle traffic and its components: time loading and unloading of products and increase vehicle speed. Increase speed vehicle is as

$$v_{T1} = \frac{2l_{ij}}{2l_{ij} / v_T - \Delta t} \text{ Km / h.} \qquad (13)$$

Such analysis capacity of ZTK bezbunkernymy HCC shows ways to improve the transport process in the technology sector harvesting and transport operations.

Example. For conditions m_K = 1 unit., TZM = 8 h., Rr = 1,5, q = 18, t., γ = 1, W_{KP} = 80 t / h., Distance transportation of products lij = 8 km, vm = 40 km / h. Determine the bandwidth links ZTK, analyze them and show ways to improve the transport process.

Decision. Bandwidth ZTK is as follows:

$$N_1 = INT \frac{m_K T_{3M} K_{3M} \tau \cdot W_{KP}}{1{,}11 q \cdot \gamma} = INT \frac{12 \cdot 0{,}81 \cdot 80}{1{,}11 \cdot 18 \cdot 1} = 38 \ од. / р.д.;$$

$$N_2 = INT \frac{n_{T3} T_{3M} K_{3M} \delta_{3M}}{1{,}23(\frac{q\ \gamma}{W_{KP}} + \frac{2l_{ij}}{v_T} + t_{T.ВИВ})} = INT \frac{4 \cdot 10{,}8}{0{,}92} = 46 \text{ units. / r.d.,}$$

where $n_{T3} = CEILING \frac{m_K T_{ЦТ3}}{T_{ЦК}} = CEILING \frac{0{,}92}{0{,}25} = 4 \ од.$

Estimated have $46 \le 38$ units. / MR., indicating a lack of inhibition of the process and the second element of a possible significant difference in the values of bandwidth. Let us analyze the possibility of reducing the bandwidth of the second link bandwidth of the first relevant reduction in vehicle to nTZ1 nTZ = -1 and a decrease in the length of time to cyclic $T_{ЦТ31}$:

$$T_{ЦТ31} = \frac{n_{T31} T_{РЦ}}{N_1} = \frac{3 \cdot 10{,}8}{38} = 0{,}85 \ год.$$

It is necessary to reduce the length of vehicle traffic will be defined as

$$\Delta t = T_{ЦТ3} - T_{ЦТ31} = 0{,}92 - 0{,}85 = 0{,}07 \ год .$$

This reduction can be achieved by reducing the time for handling or by increasing vehicle speed. Increase speed vehicle is a

$$v_{T1} = \frac{2l_{ij}}{2l_{ij} / v_T - \Delta t} = \frac{2 \cdot 8}{16 / 40 - 0{,}07} = 48{,}5 \ км / \text{год}.$$

Thus we have the equality: $N_1 = N_2 = 38 \ од. / р.д.$ case the number of TS to 3 units.

Conclusion. The technique of analysis parameters harvesting and transport complex for forage cropsfor direct transport of products combines bezbunkernyh that shows ways of ensuring equality capacity of individual links by reducing the length of vehicle sales and their number.

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Predlahaetsya method of analysis bandwidth abilities uborochno transport complex with bezbunkernыmy Forage crops with a view kormovыh usovershenstvovanyya ego parameters.

Propusknaya Ability, bezbunkernыe kombaynы, transportnыe sredstva, analysis, method, path improvement.

The technique of analysis of carrying capacity of harvesting-transport complex with bunkerless combines for forage crops for purpose of development of its parametres is offered.

Carrying capacity, bunkerless combines, transport facilities, analysis, method, enhancement ways.