ECSPERYMENTALNI STUDY COLLECTION turnip root crops

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The experimental results of the process picking tops of root crops improved hychkozbyralnoyu machine. The equation of the regression parameters of quality.

Koreneplodi, tops, rotary hychkoriz, multivariate experiment, broken roots, damaging roots.

Resolutionska problem. Roots of sugar beets are among the most important crops which produce strategic food Ukraine - sugar and get juicy fodder for livestock and other by-products.

The volume of sugar Ukraine occupies a leading position in the world, but the production of sugar from 1 ha behind
Rosedeveloped
countries of the EU.

Reducing tsukronosnoyi mass in the collection of roots due to their losses during harvesting tops by a significant amount ejected from the soil (1.5 ... 2.0%) and damaged (15 ... 20%) of roots, including by cutting surface chips head - up to 10%. This waste mass circumcision heads Koreneplodiv tops of their total mass are within 5 ... 8% [1]. The resulting poor quality of hychkozbyralnyh performance cars (GM) is not in line with those agronomic requirements on the basis of structural and technical solutions imperfections job of harvesting units.

Pidvyschennya GM technology level or quality indicators picking tops of root crops is an important task in terms of further improvement of technical solutions that are used for picking tops.
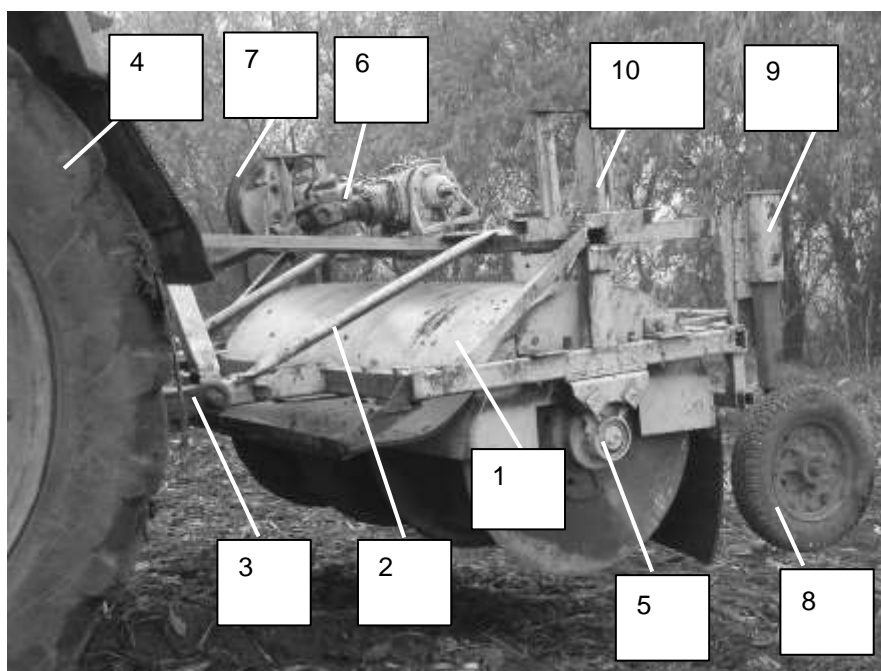
AnaLease Finalnnih dperssurvey findings. Dll Sectionidvyschennya showingers
even asSTI picking tops of root crops proposed improved construction of GM workers that perform sequential operations of massive cut tops rotary hychkorizom with subsequent removal of residues tops of heads of roots doobrizchykom such as "passive Copier-moving than" [2, 3   □.

The design of the CM is available and interconnected with each other technological elements which present specific functional properties, which contributed to the data of experimental research.

Metand   **dperssurvey findings** -
Sectionidvyschennya   indicators   technological processin picking tops of root crops by developing and operating parameters justification of GM obtained by analyzing empirical relationships.

Rezultaty   **lit.idzhen.**   DII   Suandrecovery of aboutAIN

legislativedimensions of parameters optimization (number of ejected Koreneplodiv   Rotarym K_{Bp} and   DM K_B, hychkorizom   byGenerally

poshkotion of roots rotary hychkorizom $K_{\Pi p}$ and DM general

K_Π, Including sylnoposhkodzhenyh Root GM in general KC_Π) Was conalternating-sign field experimental studies of improved GM based on the construction and implementation of experimental type PFE 32. General view of the unit for picking tops of root crops improved GM shown in Fig. 1.

Ric. 1. General view of the unit "GM + MTZ-82": 1 - GM; 2 - snytsya; 3 - hinged system tractor; 4 - Tractor; 5 - spinning hychkoriz; 6 - drive working bodies; 7 - belt transmission; 8 - support wheel; 9 - risers; 10 - GM frame.

DFor regression model that characterizes the change forilkosti knocked Root rotary hychkorizom K_{Bp} and DM general

K_B , poshkotion   Koreneplodiv   rotorit $K_{\Pi p}$ and
hychkorizom   DM
in K_Π , The number of roots sylnoposhkodzhenyh GM in general
general

$K_{C\Pi}$ from parameters Workingx Ophaniv GM, toybyraland moDPOVienna

tracksiynyy PlaCategories tryfaktortion eksperymeNTU, prand thisin independent variables taken: velocity GM V_k, asin coded index x_1; rotor speed hychkoriza $n\,x$ That koduvaDid index x_2; rotor diameter hychkoriza $D\,p$ That coded index x_3Eksperymenty conducted under standard conditions, prand this response function analysis was performed according to the requirements of GM cultural practices: the number of damaged roots - not more than 10%, including sylnoposhkodzhenyh - 5%; knocked out of roots from the soil by GM workers - less than 1.5% [4].

Resultand coding variables and their levels of variation are shown in Table.

Rezultaty encoding factors and their level variation during PFE 32.

Factors	Marking		Interval toariyuvannya	Eqand variation, Categoriesaturalni / coded		
	Kunits.	Nat.				
The velocity GM, m / s	x_1	V_k	0.4	1,4 / -1	1,8/ 0	2,2/ + 1
Mastota rotation rotor gychkoriza, rev / min	x_2	n_x	200	400/ -1	600/0	800 / + 1
Diameter rotor p gychkoriza city	x_3	D	0.1	055 / -1	065/0	075/1 +

Approximatingthe function parameters optimization $K\,Bp$ $K\,B$ $K_{\Pi p}$, K_{Π}, , ,

KC_{Π}Adequacy of which tested according to F-criterioniyem Fischer found in the form of a mathematical model of the logarithmic dependence, while after determining factors and assess statistical significance of coefficients approximating function according to Student's test [5] was obtained final form regression equations changes forilkosti knocked Root rotary hychkorizom K_{Bp} and DM general

$K\,B$, poshkotion Koreneplodiv rotorit $K_{\Pi p}$ and hychkorizom DM in K_{Π},forilkosti sylnoposhkodzhenyh Root GM in general general

$K_{СП}$ bydent on the speed of GM V_k, Rotor speed hychkoriz nx, Rotor diameter hychkoriza Dp in naturelnyh values a

Ifor functional $KB_p;\ KB;\ K_{Пp};\ K_{П};\ KC_{П}$ $= f\,(Vk;\ nx;\ Dp;)$ Ie (1).

Andstitutionalism following regression equation (1) shows that the number of

Root knocked rotary hychkorizom K_{Bp} and DM KB, general

poshkoJenie Root rotary hychkorizom $K_{\Pi p}$ andDM K_{Π}, general

forilkist withilnoposhkodzhenyh Koreneplodiv DM $K_{C\Pi}$ heartburnscrap

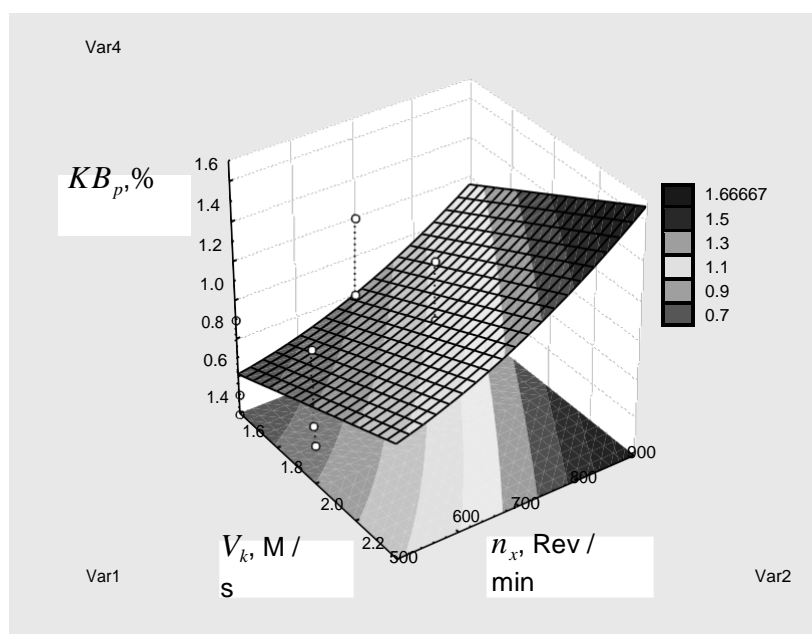fromJust minyuyetsyaproportionsiyno change factors - f r o m and increase the workingth wvydkosti pCCS DMin mthhorror 1,4 $V_k \leq 22$ (m / s) Chastoty

Oberting rotor hychkoriza 500 900 $n_x \leq$ (V /min), the diameter of the rotor

hychkoriza 0,55 $D_p \leq 075$ (m) values of options is also increasing.

$$K_{Bp} = -5{,}24 + 0{,}95 ln(V_k) + 1{,}02 ln(n_x) + 2{,}1 ln(D_p);$$
$$K_B = -5{,}4 + 1{,}42 ln(V_k) + 1{,}02 ln(n_x) + 2{,}03 ln(D_p);$$
$$K_{\Pi p} = -24{,}34 + 7{,}05 ln(V_k) + 6{,}53 ln(n_x) + 29{,}52 ln(D_{p});$$
$$K_{\Pi} = -26{,}25 + 9{,}24 ln(V_k) + 6{,}72 ln(n_x) + 28{,}89 ln(D_p);$$
$$K_{C\Pi} = -40{,}93 + 3{,}62 ln(V_k) + 6{,}78 ln(n_x) + 7{,}8 ln(D_p)$$
$$\tag{1}$$

Ric. 2. The surface response changes depending on the number of ejected

Koreneplodiv rotary hychkorizom K_{Bp} Ifor functional $KB_p = f(Vk; nx)$.

This conclusion is confirmed by the nature of the changes adequately constructed according to the regression equation (1) in response surfaces

form dependencies: $KB_p; KB = f(Vk; nx)$, ryc. 2, rice. 3;

$K_{\Pi p}; K_{\Pi} = f(Vk; Dp)$ Fig. 4, Fig. 5; two-dimensional cross-sectional surface Review

$K_{C\Pi} = f(nx; Dp)$ Fig. 6. For values of input factors $V_k \geq$ 18 m / s

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$n_x \geq$ 750 / min knocked number of roots from the soil working orgawe rotary hychkoriza K_{Bp} Or hychkozrizuvalnymy knives reexceeds the required rate is set according to agrotechnical requirements for GM 1.5% of the total number of roots accounting section, Fig. 2. With increasing speed
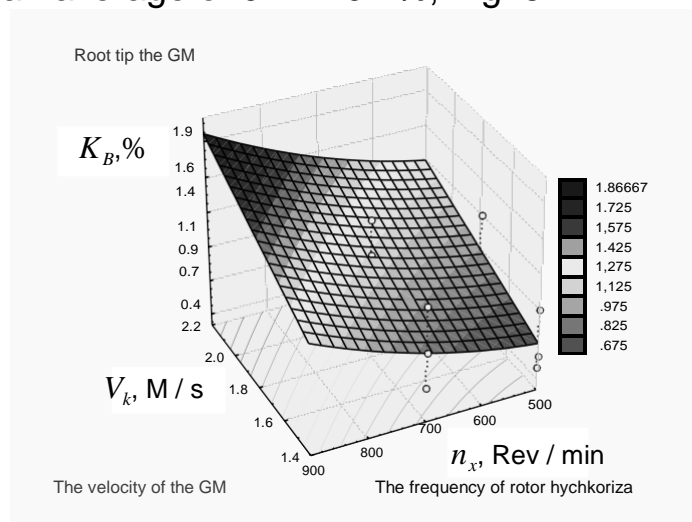
motionin GM to 1.6 m / s $K_B$not observed, and further increase

Collectionilsh to 2,2 m / s leads to an increase in the number of ejected ennya V_k

Koreneplodiv DM K_B workingand orgaus doobrizchyka heartburnscr

ap

bysurplus tops an average of 0.1 ... 0.2%, Fig. 3.

Root tip the GM

K_B,%

1.9
1.6
1.4
1.1
0.9
0.7
0.4
2.2

1.86667
1.725
1,575
1.425
1,275
1,125
.975
.825
.675

V_k, M / s   1.8

1.6

1.4
900   800   700   600   500

n_x, Rev / min

The velocity of the GM   The frequency of rotor hychkoriza

Ric. 3. The surface response changes depending on the number of ejected

Koreneplodiv GM in $K_B$lfor functional $K_B= \ f(Vk; \ nx)$. general

Andstitutionalism Fig. 4 shows that under the conditions of approving of working

speed $V_k \leq 17$ m / s (Inspeech Providetion forilkosti toybytyx

Koreneplodiv GM generally in accordance with the requirements $K_B \leq 1,5$ of cultural practices

%, rice. 3) inspeech Providetionbyshaping overall

migra- forilkosti poshkoJenie

Koreneplodiv work by GM $K_{\Pi p} \leq 10\%$ provided for

diameter of the $D_p \leq 07$ m.
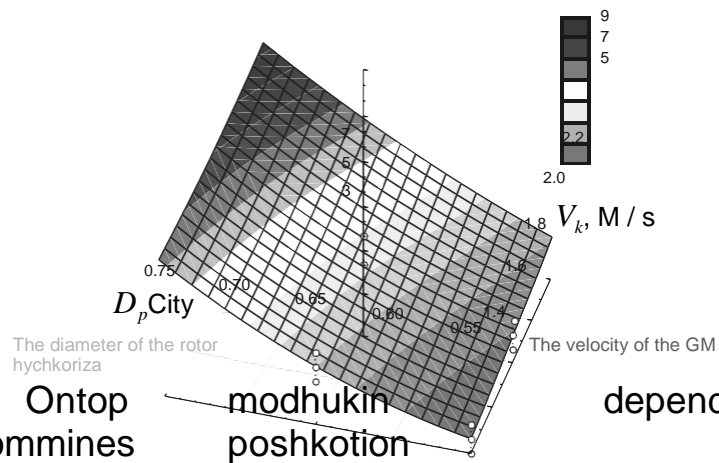
rotor

Root damaged rotor GM

10

20    $K_{\Pi p}$,%

16

14

12

333

16.363
15
13
11

9
7
5

2.2
2.0

V_k, M / s

0.75
0.70
0.65
0.60
0.55

D_p City

The diameter of the rotor hychkoriza

1.8
1.6
1.4

The velocity of the GM

Ric. 4. Ontop modhukin dependzhnosti frommines poshkotion Koreneplodiv rotary hychkorizom $K_{\Pi p}$ lfor functional $K_{\Pi p} = f(Vk; Dp)$.

With increasing speed of the GM to 1.6 m / s increase K_Π not observed, and further increase V_k to 22 m / s results in CollectionRoot damage ilshennya GM in general K_Π Workingwe orgawe doobrizchyka residues tops an average of 0.5 ... 1.0% (Fig. 5).

Root Damage GM
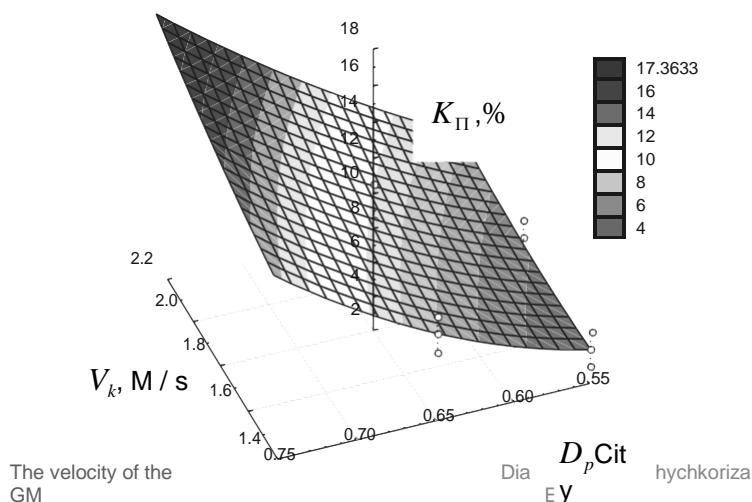
Ric. 5. Ontop modhukin dependzhnosti frommines poshkotion
Koreneplodiv GM in general Ifor functional $K_\Pi = f(Vk; Dp)$.
K_Π
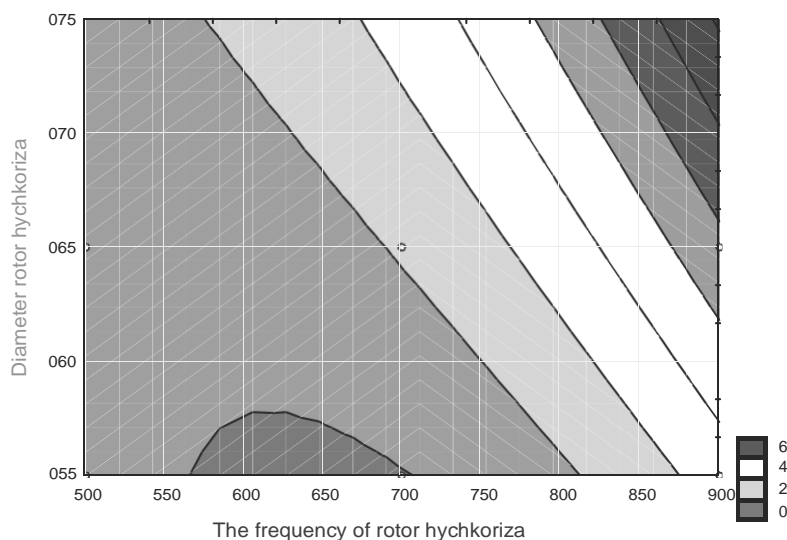
Ric. 6. dimensional cross-section surface changes depending Review
sylnoposhkodzhenyh Root GM in general $K_{C\Pi}$ Ifor functional
$K_{C\Pi} = f(nx; Dp)$.

DA diameter of the screw $D_p \geq 07$ m and rotor speed
hychkoriz a $n_x \geq$

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800 rev / sto   (Figure. 6) the number of highly   poshkoPrisoners Koreneplodiv working bodies of GM is in the range 5.3 ... 7.2

(%)Exceeding the set value (5%) according to the requirements of GM cultural practices.

Conclusion. Stillof way on the basis of the analysis of regression equations (1) can be stated that the rational parameters of GM workers in which values of quality of work within the scope of agronomic requirements are: rotor speed hychkoriza - 600 ... 700 (rev / min); hychkoriza rotor diameter - 0.6 ... 0.7 (m) for the working speed of the GM to 1.8 m / s.

References

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Shows эksperymentalnыh Results of research of technological process Cleaning the botvы korneplodov usovershenstvovannoy botvouborochnoy mashynoy. Rehressyy equation will provide a Quality indicators work.

Korneplodы, Botva, rotornыy toppers, mnohofaktornыy experiment, vыbytыe korneplodы, INJURIOUS korneplodov.

The results of experimental researches of technological process of cleaning up of tops of root crops are pointed by improved haulm gatherer. Equalizations of regression of indexes of quality of work are got systems of adapted root-harvesting machine is pointed.

Root crops, tops, rotor topper, multivariable experiment, knocked out root crops, damages of root crops.