EFFECT OF TYPE OF POTATOES PLANTING MACHINE OVER THE QUALITY INDICES, WITH REFERENCE TO THE DISTANCE BETWEEN TUBERS ALONG THE ROW

INFLUENŢA TIPULUI DE MAŞINĂ DE PLANTAT CARTOFI ASUPRA INDICILOR DE CALITATE PRIVIND DISTANŢA DINTRE TUBERCULI PE RÂND

LAZĂR C.S.[1], COJOCARIU P[2]., ROŞCA R[2].
[1]Strunga Mayoralty, county Iaşi
[2]University of Agricultural Sciences and Veterinary Medicine Iaşi

Abstract. *In this experiment three types of potatoes planting machines were tested: the six rows type 6 SAD-75 potatoes planting machine, using a vertical disc with flaps as a distribution apparatus; the four rows Cramer Marathon Jumbo potatoes planting machine, using a conveyer chain with cups on two rows as a distribution apparatus; the two rows 2 MPC potatoes planting machine, equipped with a conveyer belt with cups on two rows as distribution apparatus. The following quality indices were evaluated for the free machines taken into account: percent of good distances between tubers along the row; percent of normal distances between tubers along the row; percent of distances equal to the average distance between tubers; percent of double and triple planting; percent of single gaps; percent of double and triple gaps. It was concluded that the best results were achieved by the Cramer Marathon Jumbo potatoes planting machine.*
Key words: quality, potatoes planting, planting machines

Rezumat. *În cadrul experienţei efectuate s-au încercat trei tipuri de maşini de plantat cartofi: maşina de plantat cartofi 6 SAD-75, pe 6 rânduri, cu aparate de distribuţie a tuberculilor de tip disc vertical cu clapete de prindere; maşina de plantat cartofi Cramer Marathon Jumbo, pe 4 rânduri, cu aparate de distribuţie a tuberculilor de tip lanţ transportor cu două rânduri de cupe; maşina de plantat cartofi 2 MPC, pe 2 rânduri, cu aparate de distribuţie a tuberculilor de tip bandă transportoare cu două rânduri de cupe. La cele trei maşini s-au determinat următorii indici de lucru calitativi: procentul de distanţe bune între tuberculi pe rând; procentul de distanţe normale între tuberculi pe rând; procentul de distanţe între tuberculi pe rând egale cu distanţa medie; procentul plantărilor duble şi triple; procentul golurilor simple; procentul golurilor duble şi triple. S-a stabilit că cele mai bune rezultate le-a obţinut maşina de plantat cartofi Cramer Marathon Jumbo.*
Cuvinte cheie: calitate, plantat cartofi, masina de plantat

INTRODUCTION

In potato growth, the farmers have access to highly productive varieties and modern machinery; this is why the achievement of a rich and high quality harvest is necessary.

Potato planting is a very important operation and its quality is directly affecting the production level and the quality of the harvested tubers (Toma Dr., Sin Gh., 1987). This is the reason why the paper is referring to the testing of some types of potatoes planting machines, in order to establish whether these achieve the imposed agro technical requirements relative to the quality indices of the potato planting operation.

MATERIAL AND METHOD

Three types of potatoes planting machines were tested: the six rows type 6SAD-75 potatoes planting machine, using a vertical disc with flaps as a distribution apparatus; the four rows Cramer Marathon Jumbo potatoes planting machine, using a conveyer chain with cups on two rows as a distribution apparatus; the two rows 2MPC potatoes planting machine, equipped with a conveyer belt with cups on two rows as distribution apparatus. The U-650 tractor was used as a power source, and the real working speed was 5.57 – 5.7 km/h.

The experiments took place on a cambic chernozem type of soil, with loam texture, with a clay content of 30.2%. The terrain slope was 2...3 degrees. The soil had a good compaction state, with a bulk density of 1.25...1.37 g/cm^3, and 16 daN/cm^2 penetrability. Soil humidity was normal according to its texture, with a value of 14...15%.

RESULTS AND DISCUSSIONS

During the experiments, the effect of the type of potatoes planting machine over the quality indices (with reference to the distance between the tubers along the row) was studied. The quality indices taken into account were: percent of distances between tubers along the row equaling the average distance or being close to it; percent of good distances between tubers; percent of normal distances between tubers; percent of double and triple planting; percent of single gaps; percent of double and triple gaps (Popescu et al., 1984).

The experimental results are presented in table 1 and figure 1.

Percent of distances between tubers along the row equaling the average distance d_r or being close to it (P_{dr}). The lowest value of this index was achieved by the 6 SAD-75 (51.2%); for the 2MPC planting machine the index is significantly increasing (53.6%), and for the Cramer Marathon Jumbo machine, there is a slight increase in comparison with the value registered for the 2MPC machine (54.5%).

It can be concluded that the Cramer Marathon Jumbo machine attained the best results, but the 2MPC machine also achieved good results.

The agro technical standards require that the percent of distances between tubers along the row equaling the average distance or being close to it should be at least 50% (Bria N. et al., 1965). Considering the experimental results, it is obvious that all the tested machines have fulfilled the standards' requirement.

Percent of good distances between tubers along the row, P_{db}. The highest value of this index was recorded for the Cramer Marathon Jumbo

machine, but the 2MPC planting machine also attained good results. The 6 SAD-75 machine achieved a lower percentage of good distances between the tubers.

Agro technical standards impose that the percent of good distances between tubers along the row should be at least 80% (Popescu N. et al., 1995). Taking into account this limit and the experimental results, it can be concluded that all the tested machines achieved adequate values for this index.

Table 1

Effect of the type of potatoes planting machine over the quality indices referring to the distance between the tubers along the row

Quality indices	Values of the indices (%) for different types of potatoes planting machines		
	6 SAD-75	**2MPC**	**Cramer Marathon Jumbo**
Percent of distances between tubers along the row equaling the average distance d_r or being close to it (P_{dr})	51,2	53,6	54,5
Percent of good distances between tubers along the row, P_{db} Good distance $d_b = (0,8 \dots 1,2)d_r$	81,1	82,9	83,8
Percent of normal distances between tubers along the row (P_{dn}) Normal distance $d_n = (0,5 \dots 1,5)d_r$	93,2	94,8	95,4
Percent of double and triple planting (P_{pd}) Low distance $d_m < 0,5\ d_r$	2,7	2,5	2,4
Percent of simple gaps (P_{gs}) High distance $d_M = (1,5 \dots 2,5)d_r$	4,0	2,8	2,6
Percent of double and triple gaps (P_{gd}) Very high distance $d_{fM} > 2,5\ d_r$	0,1	-	-

Percent of normal distances between tubers along the row, P_{dn}. The lowest value of this index was achieved by the 6 SAD-75 (93.2%). For the 2MPC machine, the registered percent of normal distances between tubers along the row was 94.8%, while the highest value was recorded for the Cramer Marathon Jumbo, 95.4%.

The agro technical standards require that the percent of normal distances between tubers should be al least 90% (Popescu N. et al., 1995). It is concluded that all the planting machines meet this criterion.

Percent of double and triple planting, P_{pd}. The highest value of this index was achieved by the 6 SAD-75 (2.7%). In the case of the 2MPC machine the percent of double and triple planting drops down to 2.5%, while the Cramer Marathon Jumbo the index drops further to 2.4%.

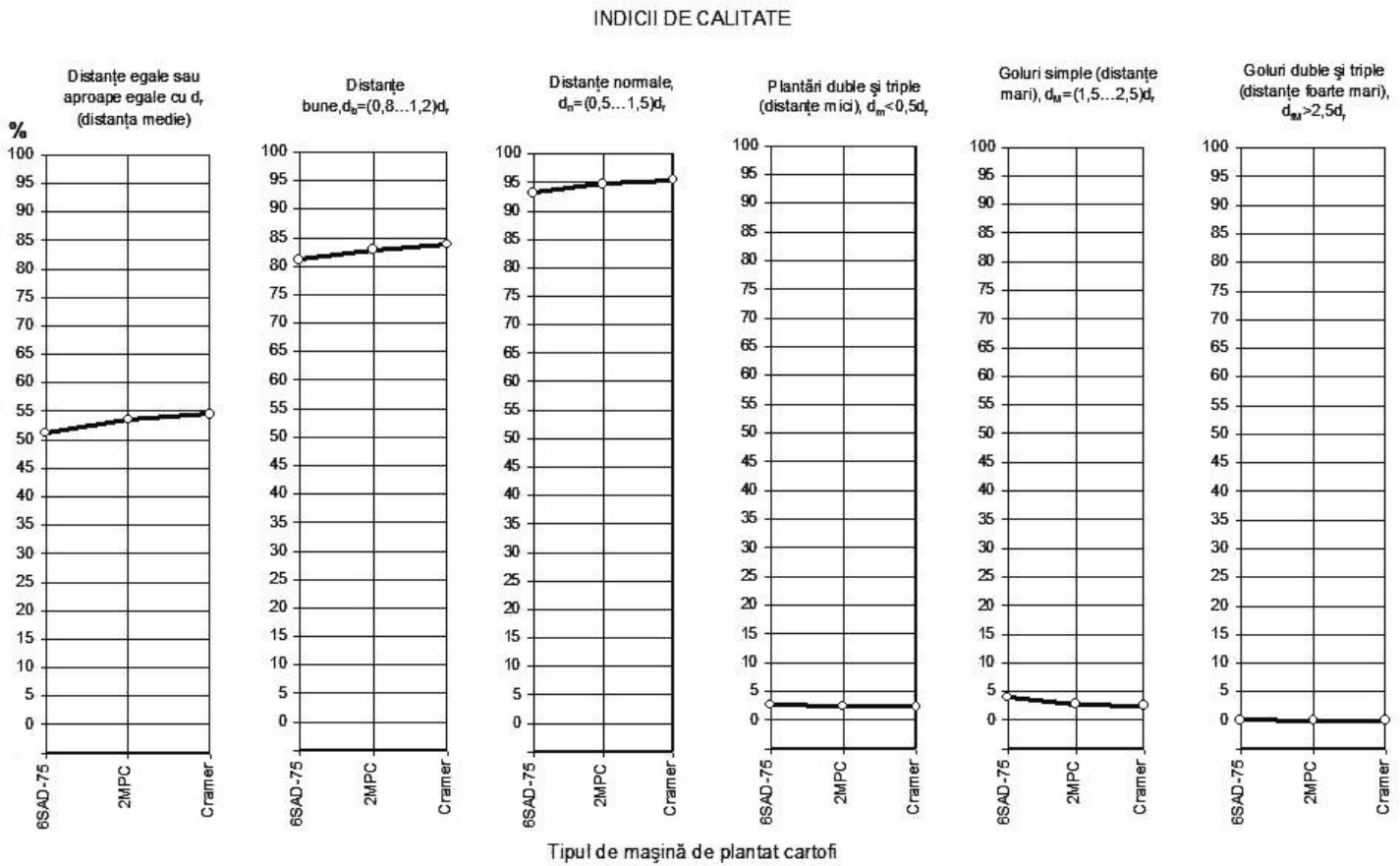

Fig.1. Effect of the type of potatoes planting machine over the distance between the tubers along the row

Agro technical requirements regarding this criterion impose an upper limit of 3% (Caras M., 1995), which is not exceeded by either of the tested machines.

Percent of simple gaps, P_{gs}. The highest value was recorded for the 6 SAD-75 planting machine (4.0%). For the 2MPC machine, the index decreased to 2.8%, and for the Cramer Marathon Jumbo machine, the percent of simple gaps decreased further, to 2.6%.

The agro technical standards require that the percent of simple gaps should not exceed 4% (Toma Dr., Sin Gh, 1987) and all the tested machines complied with this requirement.

Percent of double and triple gaps, P_{gd}. The maximum value of the index was attained by the 6 SAD-75 planting machine (0.1%). For all the other machines, the percent of double and triple gaps was zero. Taking into account the upper limit of 0.1% imposed by standards (Bria et al., 1965), it is concluded that all the tested machines have fulfilled the requirements of the standards.

CONCLUSIONS

Considering the experimental results, it was concluded that all the tested potatoes planting machines (6 SAD-75, 2MPC and Cramer Marathon Jumbo) achieved adequate values of the quality indices

The best results were recorded by the Cramer Marathon Jumbo machine, closely followed by the 2 MPC planting machine. The 6 SAD-75 machine was ranked the third, with somewhat less favorable results.

We consider that the Cramer Marathon Jumbo and 2MPC planting machines achieved better results due to the chain conveyer or belt conveyer type of distribution apparatus, which achieve a higher evenness of the distance between tubers along the row.

Taking into account the experimental results, we recommend the use of the Cramer Marathon Jumbo potatoes planting machine, which also achieved very good results for the coefficient of variation of the distance between tubers, the planting depth and the potatoes injury degree, while attaining a high productivity.

The 2MPC potatoes planting machine, which also recorded good results referring to the quality indices, may be taken into account. However, this machine has a lower productivity, due to the lower working width. As a result, the 2MPC machine shall be used only when the field conditions do not allow the use of the Cramer Marathon Jumbo machine (high terrain slope, small lost, narrow or short etc.)

REFERENCES

1. **Berindei M. and collab., 1982** – *Mecanizarea lucrărilor în producţia de cartof*. Edit. Ceres, Bucureşti.
2. **Bria N. and collab., 1965** – *Cercetări privind maşinile de plantat cartofi*. Lucrări Ştiinţifice,, vol.X, Institutul de Cercetări pentru Mecanizarea Agriculturii.
3. **Caras M., 1995** – *Cercetări privind mecanizarea plantării tuberculilor în exploataţii private*. Lucrări ştiinţifice din domeniul mecanizării agriculturii, Academia de Ştiinţe Agricole şi Silvice.

4. Huţanu M. and collab., 2003 – *Cercetări privind procesul de distribuţie a tuberculilor de cartof realizat cu aparatul tip disc cu clapete*. Lucrări Ştiinţifice, vol.46, seria Horticultură, Universitatea de Ştiinţe Agricole şi Medicină Veterinară din Iaşi.
5. **Ianoşi I.S. and collab., 2002** – *Cultura cartofului pentru consum*. Edit. Phoenix, Braşov.
6. **Popescu A. and collab., 1984** – *Rezultatele încercării maşinii de plantat cartofi 6 SAD-75 în condiţiile R.S.România*. Analele Institutului de Cercetare şi Producţie pentru Cartof din Braşov, vol.XIV.
7. **Popescu A. and collab., 1995** – *Cercetări privind realizarea şi experimentarea unei maşini de plantat cartofi pe două rânduri*. Lucrări Ştiinţifice din domeniul mecanizării agriculturii, Academia de Ştiinţe Agricole şi Silvice.
8. **Popescu A., Ianoşi I.S., 1999** – *Plantarea mecanizată a cartofului*. Edit. Universităţii TRANSILVANIA din Braşov.
9. **Suditu P. and collab., 2003** – *Influenţa mărimii tuberculilor asupra unor indici de calitate ai lucrării de plantare mecanizată a cartofului.* Lucrări Ştiinţifice, vol.46, seria Agronomie, Universitatea de Ştiinţe Agricole şi Medicină Veterinară din Iaşi.
10. **Toma Dr., Sin Gh., 1987** – *Calitatea lucrărilor agricole executate mecanizat pentru culturile de câmp*. Edit. Ceres, Bucureşti.