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INFLUENCE OF SEEDBED PREPARATION ON SUGAR BEET GERMINATION ON CRUST LIABLE SOILS IN CROATIA

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ABSTRACT

Different variants of soil preparation for sugar beet sowing were researched in the three year period (1983-1985). After a deep autumn ploughing in one variant the soil was not disk harrowed, while in the other variant disking was done imediately after autumn ploughing. In both variants six different ways of soil preparation for sowing were studied:

1. Disk harrowing in spring + seed bed preparation machine
2. Disk harowing in spring + seedbed preparation machine + rolling
3. Disk harrowing in spring + seedbed preparation machine + rolling + rolling after sowing
4. Two passes of seedbed preparation machine
5. One pass of seedbed preparation machine
6. One pass of seedbed preparation machine + rolling after sowing

Speed of germination, seedling emergence rate, yield and digestion were studied. In the variant with no disk harrowing after autumn ploughing germinatin lasted from 14.1 to 9.5 days, seedling emergence rate ranged from 62.6 to 73.4%, yield was from 32641 to 40370 kg/ha, digestion was from 14.2 to 16.2%. Far better results were obtained when after deep ploughing in autumn, the soil was immediately disk harrowed. Germination lasted from 11.7 to 6.9 days, seedling emergence rate was from 70.6 to 82.9%, yield was from 38985 to 48677 kg/ha, and digestion was from 15.0 to 16.9%.

Better results for all the properties were obtained in variants where rolling was included, and the best results were obtained in variant with disk harrowing in autumn after deep plouing and in spring with one pass of seedbed preparation machine + rolling + rolling after sowing.

Keywords: Soil, preparation, germination, yield, digestion

INTRODUCTION

Germination represents one the biggest problems in sugar beet production because sugar beet seeds germinate and shoot up slowlier in natural conditions. The seeds are tiny and contain a small amount of stored food and at shoting up they produce cotyledons outside the soil which makes shooting up troublesome. This problem becomes more difficult in pseudogley soil that is generally less fertile and contains a larger amount of silt, and in conditions of heavy rain the soil makes pudde and sometimes a hard thick crust (up to 5 cm thick) where sugar beet cannot shoot up. Such types of soil require great attention which must be paid during soil preparation. In Croatia soil for sugar beet needs deep plowghing in autumn and law temperatures during winter period cause ground frost wich significantly improves soil structure. If the soil is left in open furow, it can cause an uneven ground frost which then sometimes requires disk harrows in soil preparation for seeding. A coarse structure obtained by this operation present a porly prepared seed layer that can cause poor germination and shooting up and thin stand, that is why such a sown field must sometimes be remowed and resown with another crop. Hence, a coarse harowing of deeply ploughed soil is recommended immediately after ploughing in this way an even ground frost and a high quality soil preparation for spring sowing is obtained. All this enables switching several cultivation phases in autumn period, so less cultivation in spring decreases treading and sol compacting.

In our investigations we have combined different systems of soil preparation for sowing, trying to find out the best solution for our conditions.

METHOD

Different variants of soil preparation for sugar beet sowing were researched in the three year period (1983-1985). After a deep autumn ploughing in one variant the soil was not disk harrowed, while in the other variant disking was done immediately after autumn ploughing. In both variants six different ways of soil preparation for sowing were studied:

1. disk harrowing in spring + seedbed preparation machine
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Speed of germination, seedling emergence rate, yield and digestion were studied.

The experiment was set up according to a block method in five vegetations at Garešnica agricultural and processing plant, Hercegovac division in Croatia. The type of soil was pseudogley. The soil was fertilized with 170 kg N, 130 kg P_2O_5 and 250 kg K_2O per hectare. KW Maja variety was sown.

Influence of seed bed preparation on sugar beet germination on crust liable soils in Croatia

No	Operations of soil cultivation preparation for sowing		Shoting up days	Seedling emergence rate	Yield kg/ha	Digestion %
1.	Disk harrowing in autumn	Disk harrowing in spring+seedbed preparation machine	11.72	70.63	38985	15.06
2.	"	Disk harrowing in spring+seedbed preparation machine + rolling	10.34	74.28	42067	15.40
3.	"	Disk harrowing in spring + seedbed preparation machine + rolling+roling after	9.85	75.72	43388	15.81
4.	"	Two passes of seedbed preparation machine	10.73	76.43	43821	16.26
5.	"	One pass of seedbed preparation machine + rolling	8.56	79.56	46563	16.57
6.		One pass of seedbed preparation machine +rolling+rolling after sowing	6.96	82.99	48677	16.92
7.	No disk harrowing in autumn	Disk harrowing in spring+seedbed preparation machine	14.11	62.27	32641	14.28
8.	"	Disk harrowing in spring+seedbed preparation machine+rolling	10.84	69.22	35918	15.08
9.	"	Disk harrowing in spring+seedbed preparation machi-ne-rolling+rolling after sowing	10.05	70.41	38269	15.80
10.	"	Two passes of seedbed preparation machine	11.49	66.80	33779	15.65
11.	"	One pass of seedbed preparation machine + rolling	10.67	68.87	34730	15.99
12.	"	One pass of seedbed preparation machine +rolling+rolling after sowing	9.54	73.43	40370	16.28
LSD 5%			2.37	5.28	3863	0.85
1%			3.18	7.39	4929	1.16

In variants where in autumn the soil was harrowed immediately after deep ploughing, we optained better results in all reseached properties, compared to variants where the soil was not harroved after a deep autumn ploughing.

In variants with harrowing in autumn, shooting up lasted from 11.72 to 6.96 days, while in variants with no harrowing in autumn shooting up lasted from 14.11 to 9.54 days. The differences among the same variants are the following: for variants No 1 and No 7 2.39 days, for variants No 2 and No 8 0.50 days, for variants No 3 and No 9 0.20 days, for variants No 4 and No 10 0.76, for variants No 5 and No 11 2.11 days and for variants No 6 and No 12 2.58 days. The results shown that the application of harrowing in autumn, immediately after deep ploughing shortens the period from sowing to shooting up, especially in combinations where in soil preparation for sowing we applied rolling, and particularly rolling after sowing.

In variants with harrowing in autumn seedling emergence rate was from 70.63 to 82.99%, while in variants with no harrowing in autumn it was from 62.27 to 73.43% which shows that the seedlling emergence rate was higher when the soil was harrowed in autumn.

Among the same combinations the following differences were obtained: for variants No 1 and No 7 8.36%, for variants No 2 and No 8 5.06, for variants No 3 and No 9 5.31%, and for variants no 4 and no 10 9.63%, for variants No 5 and No 11 10.69% and for variants No 6 and No 12 9.56%. The results show that harrowing in autumn, immediately after deep ploughing, enables better seedling emergence, especially in combination where in soil preparation for sowing we also applied rolling, and the results are the best if rolling after sowing is applied. Harrowing in autumn after deep ploughing gives higher yield than harrowing in spring. This, harrowing in autumn gave the yield from 38985 kg/ha to 48677 kg/ha, while in variants with harrowing in spring the yield was from 32641 kg/ha to 40370 kg/ha. Among the same variants obtained the following differences: for variants No 1 and No 7 6317 kg/ha, for variants No 2 and No 8 6149 kg/ha, for variants No 3 and No 9 5119 kg/ha, for variants No 4 and No 10 10042 kg/ha, for variants No 5 and No 11 11833 kg/ha and for variants No 6 and No 12 8307 kg/ha. Higher yield was obtained when in soil preparation for sowing rolling was applied, whith the highest yield was with additional rolling after sowing.

Higher digestion was obtained in variants with harrowing in autumn and it was from 15.06% to 16.92%, while whith harrowing in spring we obtained lower digestion which was from 14.28% to 16.28%. The differents among the some variants with harrowing in autumn and in spring were the following: between variants No 1 and No 7 0.78%, between variants No 2 and No 8 0.32%, between variants No 3 and No 9 0.01%, between variants No 4 and N 10 1.61, between variants No 5 and No 11 0.58% and between variants No 6 and No 12 0.64%. Higher digestion was obtained in variants in soil preparation for soving rolling was applied and the highest digestion was obtained with the application of additional roling after sowing.

Influence of autumn harrowing in relation to spring harrowing on shooting up speed, seedling emergence rate, yield and suger beet digestion

No		Shooting up/days	Seedling emergence rate %	Yield kg/ha	Digestion %
1.	Autumn harrowing	9.69	76.60	43917	16.00
2.	Spring harrowing	11.12	68.50	35951	15.51
	LSD 5%	0.73	3.86	2482	0.39
	1%	1.10	4.98	3563	0.53

When autumn harrowing is applied shooting up was shorter for 1.43 days, seedling emergence rate was higher for 8.10%, yield was higher for 7966 kg/ha and digestion was for 0.49% higher. All the differences are significant on the level of P=1%, except digestion where a significant difference was obtained on the level of P=5%.

Influence of different soil preparation for sowing on shooting up speed, seedling emergence rate, yield and digestion

No	Operations of soil cultivation - preparation for sowing	Shooting up/days	Seedling emergence rate %	Yield kg/ha	Digestion %
1.	Spring harrowing+seedbed preparation machine	12.91	66.45	35813	14.67
2.	Spring harrowing+seedbed preparation machine+rolling	10.59	71.75	38992	15.24
3.	Spring harrowing+seedbed preparation machine+rolling+rolling after sowing	9.95	73.06	40828	15.80
4.	Two passes of seedbed preparation machine	11.11	71.61	38800	15.95
5.	One pass of seedbed preparation machine+rolling	9.61	74.21	40646	16.28
6.	One pas of seedbed preparation machine+rollint+rolling after sowing	8.25	78.21	44523	16.60
LSD 5%		1.56	4.66	3018	0.56
1% 2.38		6.19	4122	0.90	

Different methods of soil preparation for sowing influenced the researched properties. The longest shooting up was in variant with spring harrowing + seedbed preparation machine (12.91 days) ad the shortest in variant where we applied one parts of seedbed preparation machine + rolling + rolling after sowing (8.25 days), shooting up is shortened for 3.66 days. In variant No 1 seedling emergence rate was 66.45%, yield was 35813 kg/ha digestion was

14.67%, bet in variant No 6 seedling emergence rate was increased for 11.76%, yield was in increased for 8710 kg/ha and digestion for 1.93%. In variants with rolling, particularly with rolling after sowing, all the researched values were "Higher" in relation to variant without rolling.

CONCLUSION

We researched the influence of different methods of soil preparation for sugar beet sowing on shooting up speed, seedling emergence rate yield and digestion.

Better results were obtained in variants with harrowing immediately after deep autumn ploughing, and poorer results with variants where harrowing of winter furrow was aplied in spring.

In variants with autumn harrowing shooting up lasted from 11.72 to 6.96 days, seedling emergence rate was from 70.63 to 82.99% yield ranged from 38958 to 48677 kg/ha, and digestion was from 15.06 to 16.92%. In variants with spring harrowing shooting up lasted from 14.11 to 9.54 days, seedling emergence rate ranged from 62.27 to 73.43%, yield ranged from 32641 to 40370 kg/ha, digestion from 14.28 to 16.28%. Better results are obtained when in soil preparation for sowing, rolling is applied, particularly with rolling after sowing.

Autmn harrowing shortens shooting up period for 1.43 days seedling emergence rate is higher for 8.10%, yield is increased for 7966 kg/ha, while digestion is higher for 0.49%.

UTJECAJ PREDSJETVENE PRIPREME TLA NA NICANJE ŠEĆERNE REPE NA PSEUDOGLEJNIM TLIMA U HRVATSKOJ

SAŽETAK

U periodu kroz tri godine (1983-1985) istraživane su različite varijante pripreme tla za sjetvu šećerne repe.

Nakon dubokog jesenjeg oranja u jednoj varijanti tlo je u jesen tanjurano odmah nakon dubokog jesenjeg oranja. U drugoj varijanti tanjuranje je vršeno u proljeće. U obje varijante ispitivano je šest načina pripreme tla za sjetvu i to:

1. Tanjuranje u proljeće + sjetvospremač
2. Tanjuranje u proljeće + sjetvospremač + valjanje
3. Tanjuranje u proljeće + sjetvospremač + valjanje iza sjetve
4. Dva prohoda sjetvospremačem + valjanje
5. Jedan prohod sjetvospremačem + valjanje
6. Jedan prohod sjetvospremačem + valjanje + valjanje iza sjetve

Ispitivana je brzina nicanja, % nicanja, prirod i digestija.

U varijantama bez tanjuranja iza oranja u jesen, nicanje je trajalo od 14,11 do 9,54 dana, % nicanja se kretao od 62,27 do 73,43 %, prirod od 32641 do 40370 kg/ha, digestija od 14,28 do 16,28 %.

Daleko bolji rezultati su dobiveni kada je u jesen iza dubokog oranja odmah provedeno tanjuranje. Nicanje je trajalo od 11,72 do 6,96 dana, postotak nicanja od 70,63 do 82,99 %, prirod od 38985 do 40677 kg/ha i digestija od 15,06 do 16,92 %.

Bolji rezultati za sva ispitivana svojstva dobiveni su u varijantama gdje je uključeno valjanje, a najbolji u varijanti proljeće priprema tla za sjetvu jedan prohod sjetvospremačem + valjanje + valjanje iza sjetve.

Ključne riječi: tlo, obrada, nicanje, prirod, digestija.

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