KRMIVA

SOD SEEDING OF WINTER CEREALS INTO THE SWARD OF INTENSIVE PASTURE

USIJAVANJE OZIMIH ŽITARICA U TRATINU INTENZIVNOG PAŠNJAKA

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SUMMARY

Results of one year field experiment on winter cereal sod seeding into pasture sward are present in the paper. Winter wheat, barley and rye in combination with fertilisation and herbicide application were drill. Hunter's Rotary Strip Seeder was use to set experiment 3.2 ha in area. Fertiliser was apply only in drilled strips. Herbicide glyphosat was apply 10 days prior drilling. One part of the experiment was use for silage cut and other part for to harvest the grain. The highest yield was obtain with the rye (4.5 t/ha). Four weeks after cereal harvest sward was graze again with dairy cows. Establish of white clover was good as noticed in late summer. Most important of all is the effect of sod seeded cereals on root penetration deeper in soil. This way the roots of sward plants could grow deeper into the soil and get better supplies of water during summer dry period.

Introduction

Sod seeding is a method of improving pasture botanical composition and this way alters its production level, by introducing higher productive grass and clover cultivars into old sward, with special designed drills. In recent years sod seeding technique for improving pasture swards under climate conditions in Slovenia was investigate quite extensively (Vidrih and Košmrl, 1988; Vidrih, 1990 a; Vidrih et al. 1991). Similar work was carry on for cut meadows (Korošec et al. 1986; Vidrih, 1990b; Čop et al. 1991). Sod seeding is becoming more and more popular among farmes, because of two very dry years in a line and 8 direct drills are at present in Slovenia.

New methods in crop production must be investigated too, if our objective is to develop a sustainable agriculture. Very intensive soil cultivation and high amount of nitrogen are two characteristic of modern, high yielding, crop production. There is enough evidence that this leads to degradation of crop land and some pollution problems in adjacent area. On other side well documented is effect of grass sward on improving physical properties and fertility of the soil, mainly by building higher content of organic matter and making soil particle size larger.

As long as crop is use for to feed animals the efficiency of nitrogen use is very low. High amount goes back to the farm land and problem with ground water pollution occurs if this goes on for longer time. There are different measures how to reduce amount of nitrogen in soil solution. Most effective in economical way is to use it for better plant growth. Growing of winter cereals could be one of these measures if sod seeding technique is use to establish the crop after autumn heavy grazing.

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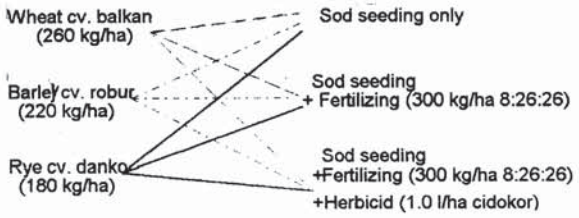
The objective of this work was to investigate the possibility of growing winter cereals on intensive pasture. This was not just to produce a grain crop. Most important is to interfere in the soil over some processes that effect development of grass / clover roots and persistence of white clover in grazed swards.

Method

For direct sod seeding the winter cereals (wheat, barley and rye) in combination with fertilisation (only in seeded rows) and herbicide (glyphosat) application were use. Experiment was 3.2 ha in area, sod seeding was complete on September 24 and there was 9 treatments as follows:



Pšenica (260 kg/ha), Samo usijavanje
Ječam (220 kg/ha), Samo usijavanje+ fertilizacija (300 kg/ha 8:26:26)
Raž (180 kg/ha), Samo usijavanje+ fertilizacija (300 kg/ha 8:26:26) + Herbicid (1.0 l/ha cidokor)

Old sward was sprayed 10 days before seeding (only herbicide treatment) and fertilise was applied at the time of seeding. Hunter's Rotary Strip Seeder was used to set the experiment. This drill cultivates for each seeding row 75 mm wide trip, 2-3 cm depp. The seeds and fertiliser are place there. Rows are 230 mm apart and these mean that 2/3 old sward is not destroy, the grazing can go on after sod seeding. Prior the seeding the sward was close graze. Observations and measurements on development of the crop were conduct on month interval. Part of experiment was cut as silage crop in mid June, and the rest was harvested as a grain one month later.

Results

Germination and seedling growth of drilled grains were very good. Round half of the plants start to tiller before the winter; more on fertilised plots and less on control plots. Most vigorous growth was notice with rye and wheat has the slowest development (Table 1). Sward between the rotovated strips continued to grow and at the end of November there was 1.8 t/ha DM of herbage mass. On plots sprayed with herbicide less than 1.0 t/ha of dry matter was find.

Very good over wintering of experimental crop comparable to winter cereals'crop on other fields in the some area, has been noticed at the beginning of March. This

Table 1. Number of tillers per 1 m of drilled row before and after the winter
Tablica 1. Broj izdanaka po 1 m usijane površine prije i poslije zime

Cereals - Žitarice	Sod seeded only (S.s) Samo usijavanje (S.s)		S.s. + Fertilised (Fe) S.s. + fertilizacija		S.s. + Fe. + Herbicide	S.s. + Fe. + Herbicidi
	December Prosinac	March Ožujak	December Prosinac	March Ožujak	December Prosinac	March Ožujak
Barley - ječam	66	47	84	79	78	76
Wheat - pšenica	62	55	72	66	71	64
Rye - raž	85	80	97	80	96	88

Table 2. Total herbage mass on sod seeded cereals during spring (kg/ha DM)
Tablica 2. Ukupno zelene mase na usijanim žitaricama u tijeku proljeća (kg/ha ST)

Cereals - Žitarice	Sod seeded only (S.s) Samo usijavanje (S.s)		S.s. + Fertilised (Fe) S.s. + fertilizacija		S.s. + Fe. + Herbicide	S.s. + Fe. + Herbicidi
Date - dani	April 24th 24. travanj	May 18th 18. svibanj	April 24th 24. travanj	May 18th 18. svibanj	April 24th 24. travanj	May 18th 18. svibanj
Barley - ječam	1.512	4.826	1.908	4.968	900	2.512
Wheat - pšenica	1.464	5.280	1.788	5.400	924	2.616
Rye - raž	1.560	5.592	2.004	5.776	1.080	2.992
Average - prosjek	1.512	5.232	1.900	5.381	987	2.707

could be the result of the way the Rotary Seeder does its work; portion of cultivated soil throws on the side of the rows. Level of the soil in strip is little lower than on the surroundings. Addition accumulation of the snow in this "ditches" protected seedlings and improved water supply to the crop at the end of the winter. In April and May the total herbage mass of the crop was estimate (Table 2).

On sod seeded plots only, the height of old sward and cereal crops were identical. On plots received fertiliser, cereals were higher for up to 20% and there was in average the yield of dry matter biger for 400 kg/ha. On herbicide treated plots white clover was find as an under storey crop between rows of cereals, and total herbage mass was much lower than on control plots. In mid June crop was cut for silage and yield of herbage was round 30.0 t/ha. One third of the experiment (plots treated with herbicide) was harvest as a grain one month later. The highest yield with the barley - 2.5 t/ha; wheat yielded 3.5 t/ha and lowest was the yield with the barley - 2.5 t/ha. During summer and autumn whole area was put under the grazing with dairy cows again. The regrowth after silage cut has great value for summer grazing. Without any renovation of pasture the sward was use for grazing 4 weeks later. This was during period of dry weather, when on other fields was lack of herbage. White clover survived under cereal crop very well and its high content improved herbage palatability substantially. On plots where herbicide was use higher invasion of annual herbs was notice, but until end of the grazing season these differences in sward composition diminished.

Conclusion

Sod seeding of winter cereals into intensive pasture was very successful. High yield of herbage mass or medium yield of grain was obtain depending of additional measures taken at planting time. To grow cerreals for grain, additional fertiliser and herbicide treatment must be use. For better success some cultivars with longer steams must be use. Barley as a short straw cereal is less suitable for to grow on pastures.

Growing cereals on pastures has some beneficial effects on further productivity of grazed sward. Plants are depositing during growth through rott's excudates that could have depressive effect on its persistence. With sod seeding of cereals the growth of old sward is reduce for a short time, ecxudates from sward plants are decompose or reuse and better growth can be expect again. Roots of sod seeded cereals go deeper than were growing roots of sward plants. Nutrient and water supply of a sward can be improve after cereal crop this way too.

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SAŽETAK

U radu su izneseni jednogodišnji rezultati poljskog pokusa o usijavanju ozimih žitarica u pašnjačku tratinu. Usijavane su ozima pšenica, ječam i raž u kombinaciji s gnojidbom i tretiranjem tratine pašnjaka s herbicidom. Sjetva je obavljena na 3,2 ha sa specijalnom sijačicom Hunteris Rotary Strip Seeder. Gnojidba je primjenjena samo na sijačim trakama, a deset dana prije sjetve postojeća tratina tretirana je s herbicidom glyfozatom. Veći dio eksperimentalne površine je pokošen i dobivena zelena masa je silirana, a manji dio eksperimentalne površine je ostavljen da usijane žitarice dozriju i nakon toga su požnjevene. Najveći prinos ostvaren je s raži (4,5 t/ha). Četiri tjedna nakon žetve tratina je ponovo popašena s mliječnim kravama. Učešće bijele djeteline u tratini znatno se je povećalo u drugoj polovici ljeta, pošto se je nakon žetve tratina prorijedila.

Usijavanjem žitarica u tratinu pašnjaka, korjenov sustav žitarica dublje prodire u tlo nego što to uspijeva korjenovom sustavu tratine. Na taj način korjenov sustav tratine može dublje prodrijeti u tlo čime se poboljšava bolja opskrbljenost tratine za vodom i hranjivim tvarima.

IZVLEČEK

Vsejavanje ozimnih žit v rušo intenzivnega pašnika

V prispevku so predstavljeni enoletni rezultati poljskega poskusa o vsejanju žit v rušo intenzivnega pašnika. Uporabljene so bile ozimine, pšenica, ječmen in rž v kombinaciji z gnojenjem in tretiranjem obstoječe ruše s herbicidom. Setev je bila opravljena s specialno sejalnico Hunters Rotary Strip Seeder na 3.2 ha velikem zemljišču. Gnojeno je bilo samo v pasovih vsejavanja, herbicid glifosat pa je bil uporabljen 10 dni pred setvijo. Večji del poskusnega posevka je bil pokošen in zelinje je bilo silirano, manjiš del pa je bil puščen, da je zrnje dozorelo in nato je bil posevek požet. Največji pridele je dala rž+ in sicer 4.5 t/ha. Štiri tedne po žetvi so se na poskusnem zemljišću zopet pasle krave. Bela detelja se je v drugi polovici poletja močno uveljavila v ruši, ki je ostala po žetvi žit razredčena. Najbolj pomembno pri vsejavanju žit v rušo pa je dejstvo, da korenine žit zrastejo globlje v zemljo kot pa to uspeva koreninam rastlin ruše in s tem izboljšajo oskrbo ruše, ki zraste po žetvi, z vodo in rudninami.