

OVERSEEDING METHODS FOR COMMUNAL GRASSLAND

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ABSTRACT

Two establishment methods, cultivator+roller and grassland drill, in combination with four plant mixtures were evaluated for the improvement of degraded communal grassland in two provinces of Eastern Anatolia. The establishment had been satisfactory with both methods and no significant differences were observed between two overseeding methods. Sainfoin, alfalfa, smooth brome and crested wheatgrass were used in this work and plant mixtures consisted of one legume and one grass species. Compatibility of introduced seedlings with existing vegetation was very weak. Although, the contribution of introduced plant mixtures to DM yield was significantly higher under protected condition, the survival and regeneration rates of these forages under traditional grazing conditions was low and their disappearance from the vegetation was very fast. Hence, it was concluded that renovation of deteriorated communal grassland with available erect type legumes is not feasible and improvement of creeping type, grazing and drought resistant legume species is urgently needed.

KEYWORDS

Grassland, communal, overseeding, plant mixtures, sowing methods

INTRODUCTION

Grassland is the fundamental part of livestock production in Eastern Anatolia but livestock increase which is in fact common in all provinces has meant that the present stocking rate on rangelands is far in excess of carrying capacity, in some cases being as much as 3-4 times what the ranges can properly carry. This situation is reflected in the decreasing animal productivity and disappearance of valuable perennial forage species which have turned many rangelands into unpalatable weed dominated ranges. This has greatly reduced the protective vegetative cover on the soil, leaving it subject to accelerated erosion and in drier environments, initiates a process of desertification. Some studies on range rehabilitation, indicates that recovery of vegetation by means of simple techniques such as deferment and resting is not possible in a reasonable period on these type of rangelands (Büyükburç et al., 1991). Although, grassland is a vital component of livestock enterprises in the region little work has been done for the rehabilitation of communal rangeland in the region. Thus, this study aimed to investigate appropriate overseeding methods for the rehabilitation of deteriorated natural grassland in the region.

METHODS

Establishment studies were conducted in the alpine range of Eastern Anatolia which is characterized with winter cold continental climate. The first study was located 2050 m above sea level, on a loam soil which had pH of 6.5, and organic matter content of 4.01 %. Phosphorus content was 10 ppm (Olsen) and potassium content 155 ppm (ammonium acetate). The second experiment was established 1700 m asl, on a free draining clay loam soil which had pH of 7.5 and organic matter content 0.87 %. Available P_2O_5 and K_2O were 9 and 433 ppm respectively. Annual precipitation, mainly snow fall, was 500 and 400 mm in first and second location respectively. In combination with 2 sowing methods, range drill and cultivator+roller, 4 grass-legume mixtures which consisted of one grass, one legume species, were tested in both locations. Considering the results of previous work (Tosun et al., 1971) in similar ecological conditions (Gökkus, 1984), alfalfa (*Medicago sativa* L.) and sainfoin

(*Onobrychis viciifolia* L.) as legumes, smooth brome (*Bromus inermis* Leyss.) and crested wheatgrass (*Agropyron cristatum* L.) as grasses were used in the study. The proportion of climax species were very low at both experiment sites and *Poterium sanguisorba*, *M.falcata* and *Festuca ovina* were sparse species in both locations.

Due to erosion risk on hilly rangeland, two trials were direct sown with 20 cm row spacing in April 1993. Each study had 3 randomized blocks of 27 plots, 5x20m, which were fenced for the establishment year. Seeding rates per hectare were 30 kg of sainfoin (S), 5 kg of alfalfa (A), 15 kg of crested wheat grass (CW) and smooth brome grass (SB) species (Gökkus, 1984). Since the potassium level was sufficient in the soil, P_2O_5 and N were applied to the seedbed including check plots, each at 75 kg/ha. Seedlings were identified and counted during June and existing vegetation was lightly grazed by sheep to increase the compatibility of sown seedlings. The plots were also lightly grazed in the second year and seedlings were counted to determine the survival rates. DM production was measured in the second year of both experiments.

RESULTS AND DISCUSSION

Despite the significant variation among the treatments, the number of emerged seedlings per square meter was very satisfactory in all plots in the establishment year. In terms of emergence rates, the difference between the sowing methods was not significant in either trials. Emerging seedling numbers significantly ($P<0.01$) differed between the pasture species, alfalfa being the best one in the first, CW in the second trial. Alfalfa and SB mixture gave the highest germination rate in both trials in combination with cultivator in the first and range drill sowing method in the second experiment. Despite the successful germination of the pasture in the establishment year, a sharp decline was observed in the survival rates of all plant mixtures regardless of sowing methods and locations. In the second year, only 9.4 % and 5.6 % of seedlings survived in the first and second experiment respectively. The difference between the survival rates of forage mixtures was significant ($P<0.01$) and in combination with cultivator sowing method, sainfoin +SB mixture had the highest survival rates with 18.1 % and 9.5 % in the first and second location respectively.

With the introduction of forage mixtures into rangeland, dry matter yield production was doubled. Despite the low survival rates of forage plants, the contribution of mixtures were very satisfactory, with an increase in DM yield from 1.4 ton/ha to 2.8 ton/ha in the first, from 2.8 ton/ha to 4.9 ton/ha in the second experiment. In regard to DM yield there was no significant variation between sowing methods in both trials but first and second DM production was obtained from range drill planting in both locations. However, DM yield of mixed swards differed significantly ($P<0.01$) in both locations. While the highest DM production was recorded with range drill and sainfoin + SB combination which was followed by range drill and alfalfa + SB, the lowest DM production was in range drill and sainfoin + CW combination in both experiments. The findings indicate that, in combination with ordinary rollers modified traditional cultivators can be used in rangeland overseeding when a rangeland drill is not available. Considering the survival rates of mixtures it is not easy to make solid recommendation with the experiment results. However, it is clear that rangeland type forages, especially legumes which are resistant to cold, drought and heavy grazing conditions, need to be

improved. The regional flora is very rich in creeping type grazing resistant legume species, utilization of this potential will greatly improve the success of overseeding on communal grassland. The result of this study has shown that, an economic production improvement on deteriorated communal grassland is possible. This increase will enable beneficiaries to improve stocking rate of rangeland and establish a balance between carrying capacity of range and existing animal numbers.

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Figure 1
Germinated and survived mean seedling numbers in the first and second experiment.

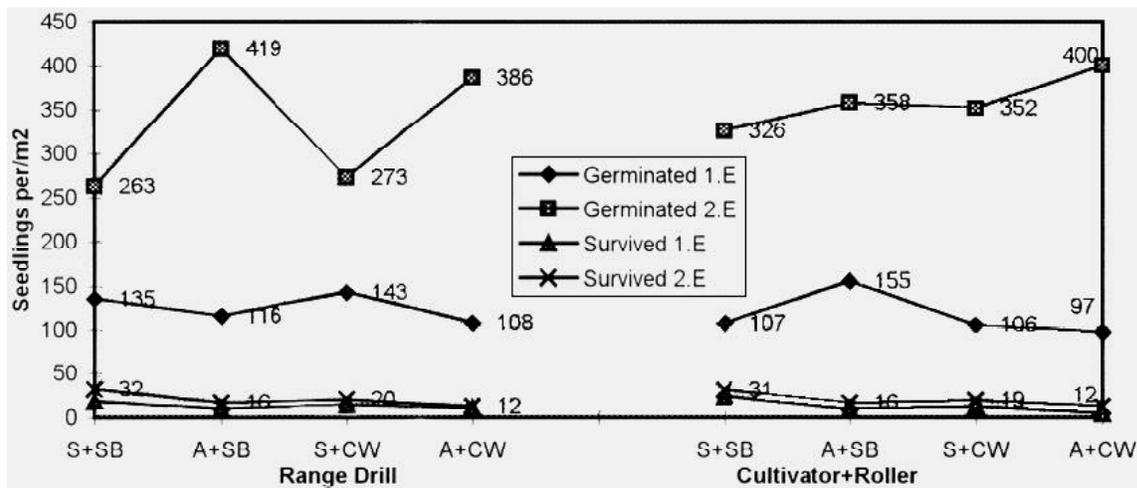


Figure 2
Mean dry matter yield of first and second experiment

