A VILLAGE APPROACH IN REHABILITATION OF DEGRADED PASTURES ON MARGINAL LANDS IN WEST ASIA

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ABSTRACT

The objectives of the present study are to demonstrate techniques of native pasture improvement to farming communities and to assess their ability to apply pasture management, including deferred grazing. The work was conducted in four villages in north west Syria and in one location in Beka'a, Lebanon. The results indicated significant improvement on pasture productivity and the farmers showed a positive attitude towards adopting the new practices.

KEYWORDS

grasslands, clovers, grazing management, phosphate fertilization

Introduction

Mediterranean grasslands occur within the cereal zone of west Asia, where cropping is not possible because of shallow, stony soils and steep slopes. These native pastures are sometimes referred to as marginal lands because there is no alternative use to grazing. They are overgrazed by sheep and goats and frequently suffer from nutrient deficiency (N and P) and severe soil erosion. They are either managed by local communities or held as government-owned land. Grasslands are heavily grazed, particularly in spring (Cocks and Thomson, 1988), and due to low productivity large amounts of supplementary feeds such as barley grain, cereal and legume straw, green barley, crop by-products, and sown forages are fed to small ruminants. Improved productivity of grasslands should reduce supplementation needs and increase carrying capacity. Application of phosphate even at 25 kg P_2O_5/ha stimulates seed production and biomass of native legumes - mainly clovers: *Trifolium tomentosum* L, *T. campestre* Schreb. and *T. stellatum* L (Osman *et al.*, 1991; Russi *et al*. 1992). The above species are particularly adapted to the intensive overgrazing because these clovers have small seed size, which enable them to pass through the digestive system of small ruminants (see paper No. 168, theme No. 25 - communal grazing lands). The above species and many native pasture legumes with similar characteristics were collected and their seed multiplied at ICARDA. The build up of seeds in the soil is an essential step towards improvement of productivity in these degraded pastures, which form a large part of the land surface in west Asia and on which small ruminant production largely depends. The above techniques have been developed and tested under Research Station conditions. The objective of this study is to test and transfer these techniques to farming communities in northern Syria and Lebanon.

MATERIALS AND METHODS

In 1993, a farmer at Batajek, 72 km north east of Aleppo, Syria (annual rainfall average 250 mm), requested help with rehabilitation of his marginal lands. The same farmer had in the past cooperated with ICARDA in on-farm demonstrations, introducing forage legumes into rotations with his barley. In November 1993, an experiment was started on a hill site covering 32 ha, owned by the farmer and his two brothers. Plots were marked out as 2-3 ha unfenced area in a randomized complete block design with three replications. Treatments included: (1) fertilizing paddocks with 25 kg ha^{-1} P_2O_5; (2) oversowing with legume seeds and pods; (3) oversowing and fertilizing and (4) a control treatment with no seeding or fertilizer.

A similar activity was started in 1992 on a government-owned hill behind Terbol, near Zahle, in the Beka'a Valley of Lebanon (33° 49'N, 36° 09'E). The area is generally steep with hills rising 1100-1200 m above sea level. The soil is shallow (7 to 26 cm) with a pH between 6.9 and 7.9 and a relatively high level of phosphorus (10-20 mg kg^{-1}). The ground is covered with rocks. The long-term average rainfall of the site is about 600 mm $year^{-1}$. The area is heavily grazed in early winter, spring and early summer by sheep and goats from nearby villages. There were four treatments: (1) seeding with a mixture of native legumes, (2) seeding and fertilizing with phosphate fertilizer at 60 kg P_2O_5 ha^{-1}, (3) natural pasture (control) and (4) natural pasture (open access to grazing). Each treatment occupied a plot of 100 m x 15 m, running down the north-facing slope except treatment 4, where the plot was 0.25 ha. There were four replications. The phosphate was broadcast at the time of sowing the seed mixture during early November. The following species are included in the pasture seeding in Syria and Lebanon: *Trifolium stellatum* L., *T. campestre* Schreb., *T. tomentosum* L., *T. resupinatum* L., *T. purpureum* Loisel., *T. lappaceum* L., *T. speciosum* Willd., *T. angustifolium* L., *T. haussknechtii* Boiss., *T. scabrum* L., *T. pilulare* Boiss.; two selections of *Medicago rigidula* L. (1919 and 716) and one selection of *M. rotata* Boiss.; *Scorpiurus muricatus* L. and *Hippocrepis unsiliquosa* L. All the species except medics were mixed and broadcast at a total seed rate of 9.6 kg ha^{-1} while the medics were sown at a rate of 100 kg pods/ha (25 kg/ha each accession).

In 1994 three more villages in north Syria joined the activity, a total area of 65 ha belonging to Tarheen (22 ha), Tel Jerji (13 ha) and Tel Attia (30 ha) were seeded and fertilized in November 1994. The participant farmers in Syria agreed to defer grazing for one month (mid-April to mid-May), while in Lebanon, a guard was hired to protect the pasture during April-May.

RESULTS AND DISCUSSION

Pasture productivity was improved significantly as the result of sowing new legumes and fertilization compared to the control treatment. For example, the total herbage biomass of legumes increased by 3-fold over the control in April 1995 at Batajek. Similarly, legume seeds in the soil increased by 1-, 3- and 8-fold over the native grazed treatment at Tarheen, Tel Jerji and Tel Attia, respectively at the end of the season (June 1995). These are similar to the results obtained on the station at ICARDA, using phosphate fertilization (Osman *et al*., 1991). Also at Terbol, Lebanon the legume component of the pasture increased as a result of sowing treatments by 1.5 to more than 3©fold over the natural pasture (open access or protected control, respectively). Total herbage production was similar for the treated or protected plots, however they produced more dry matter than the open access pasture (Table 1). Pasture seed bank was lowest under continuous (open access) grazing. Excluding grazing for one season without any other treatment, resulted in increase in legume seed number and seed weight of more than 2-fold over the open access grazing (Table 1). A previous study in Lebanon (Osman and Cocks, 1992) indicated that partial protection from grazing for one or two months in late winter-spring more than doubled the number of legume seeds in the seed bank compared with open grazing. The farming community in the present study adopted a new grazing management, especially in areas where the pasture was owned by an individual or a group of farmers. Having seen the positive change in pasture composition and biomass production, the

farmers in the four Syrian villages decided to extend the deferment of grazing for different periods. At Bataject they decided to use the pasture late in the season (October), coinciding with feed shortage period in their feeding calendar. At Tarheen and Tel Jerji they decided to extent the pasture protection for another year, while at Tel Attia the pasture was opened for grazing in May, immediately after the rest period. For the government owned pasture in Lebanon, grazing was allowed for ten days in March 1996 by 700 sheep (owned by eight people), which resulted in saving in the supplementary feeds, estimated at 1400 USD.

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Table 1

Herbage yield of legume and total herbage yield (legume + grass + other species) in April 1994 and legume seed mass (g m^{-2}) and seed number (m^{-2}) in June 1995 in different types of pastures at Terbol, Lebanon.

	Herbage t ha^{-1}	
	Legume	**Total**
Natural pasture (open access)	0.26	1.06b
Natural pasture (protected)	0.48cb	2.44a
Sown pasture	1.08ab	2.12a
Sown and fertilized pasture	1.2a	2.66a
SEM (4 observations per mean)	0.19	0.32

	Legume seed[1]			
	Mass	**SEM**	**Number**	**SEM**
Natural pasture (open access)	3.66	0.83(10)	3065	575(10)
Natural pasture (protected)	11.63	1.85(10)	9696	1448(10)
Sown and fertilized pasture	14.47	1.61(20)	8235	965(20)

1. Based on samples taken along unreplicated transects along different types of pastures. Number of observations per mean in parenthesis.