USE OF GRAZING ANIMALS IN RE-SEEDING DEGRADED MARGINAL LANDS IN NORTHERN SYRIA

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ABSTRACT

Seed mixture of sixteen native legumes were fed to sheep as a single meal and their passage through the animals was monitored in the faeces. The same mixture was used in a field experiment to improve degraded pasture. Over two hundred sheep were allowed to graze the improved pasture and rest on a nearby un-improved (target) pasture during four days. Results showed that legumes with smaller seeds were able to pass through the animals undamaged compared with large seeded species. The field study provided confirmation of the animal feeding study and provided evidence that grazing animals can help in rehabilitation of degraded marginal lands.

KEYWORDS

grazing, sheep faeces, clovers, seeds, ingestion

INTRODUCTION

An experiment conducted for several years on Mediterranean grassland, in northern Syria, in which sheep were grazing the pasture continuously, showed that large seeded legumes such as *Vicia sativa* L., *Lathyrus sativus* L., *Medicago rigidula* (L.) Desr., and *Onobrychis crista-galli* (L.) Lam., have declined in proportion, and the small seeded clovers (*Trifolium campestre* Schreb., *T. stellatum* L. and *T. tomentosum* L.) became the most frequent legumes (Osman *et al.*, 1991) This was probably due to the ability of the latter group to pass through the grazing animals, which were then re-established on the pasture. The recovery of ingested seeds by ruminants have been reported by many authors (Piggin, 1978; Simao et al., 1987; Thomson *et al*., 1990; Barrow and Havstad, 1992). In the present study sixteen native legumes belonging to *Trifolium*, *Medicago*, *Hippocrepis* and *Scorpiurus* were compared for their passage through the animal. Also the role of sheep in transporting legume seeds from one area to another was also studied in an other field experiment.

MATERIALS AND METHODS

Sixteen native legumes: eleven species of *Trifolium*, three medics *Medicago* spp., one *Hippocrepis* species and one species of *Scorpiurus* were mixed (15 g each) and fed to sheep as a single meal, and their passage through the animal was monitored in the faeces. The seed mixture was added to the diet which consisted of 500 g vetch hay plus 300 g barley grain per sheep. The experiment used ten sheep, each animal considered a replication. Faeces were collected from the sheep after 6,12,24,36,48,72,96 and 120 hours. These were air-dried, hand threshed and their seed content separated and identified into legume species. Germination tests were carried on three replications of one hundred seeds of each legume, at 20°C for ten days. Germinated seeds were counted and removed, and the rest were scarified and re-tested for germination to assess viability. A four-hectare marginal land pasture, at Batajek, 72 km north west of Aleppo, Syria, was improved in November 1993 by sowing the above sixteen native legumes, fertilized with 11 kg P ha^{-1} (triple super phosphate) and protected from grazing. In October, 1995 the same pasture was opened for grazing by 220 sheep for four days. At the time of grazing the pasture contained a high proportion of mature dry legumes (35%), though the majority of grazeable feed was contributed by *Poa bulbosa* and *Carex* sp. Each day the animals grazed the pasture during day time, and they were spending the night on nearby area (2 ha) of degraded marginal land, referred to as target pasture. The target pasture was sub-divided into four sections and the sheep were spending the night on one section at a time. At the end of the four days, forty eight faecal samples were collected representing the four pasture sections. The samples were hand threshed and the seeds, identified and counted. In April 1996, herbage samples were taken from inside and outside twenty cages - 60 x 60 x 40 cm (five cages on each pasture section) which were placed along transects across the target pasture at the beginning of the experiment. The pasture was too short to cut and so each of the samples comprised four cores (10.5 cm diameter) to a depth of 10 cm, removing plants and a large portion of roots. The samples were separated into legumes, grasses and other species. Roots were discarded and the shoot portion of each category was dried (70°C) and weighed.

RESULTS AND DISCUSSION

Maximum seed recovery after ingestion occurred at 72 hours. The highest seed recovery in all sixteen legumes was recorded for *Trifolium campestre* and *T. tomentosum* (> 70%), medic species ranged 20 to 50% while the lowest was *Hippocrepis unsiliquosa* - at less than 2% (Fig. 1). This is in agreement with the findings by Thomson *et al*. (1990) who reported higher recovery after ingestion by sheep for clover seeds compared with medic seeds. In their study, the seed mass of clovers ranged between 1.1 and 6.8 mg $seed^{-1}$ and medic between 3.4 and 11.9 mg $seed^{-1}$. The germination tests performed on seeds recovered from sheep showed different pattern for different species. Some *Trifolium* species showed a slight decrease in their hardness after passing through the rumen, while others became harder after ingestion. Seeds of the two medic species (*M. rigidula* and *M. noeana*) were slightly softer after ingestion, while *M. rotata* remained unchanged. All the legumes however, showed high viability after passing through the animals. Legume seeds transferred by sheep to the target pasture is shown by Table 1. The highest seed was contributed by *Trigonella monspeliaca* followed by four *Trifolium* species, all are small seeded type. This phenomenon could also explain why the former species (*T. monspeliaca*) was able to survive despite the heavy grazing on marginal lands. The number of plants recorded (Table 1) does not reflect the high number of seeds in the faeces, this is may be due to fact that most the faeces were still intact in April. This is probably due to the lack of enough trampling by animals or moisture (Total rainfall in 1995/96 at Battajek was 500 mm). Nevertheless, the maximum number of plants recorded in April belonged to *T. monspeliaca* and *T. tomentosum*. Although *T. campestre* ranked second in number of seed deposited by animals, few plants were observed in April. The highest number of seeds and plants on the target pasture was observed on the 3rd day (Table 1) which confirm previous findings referred to earlier, that the maximum seed recovery after ingestion occurs at 72 hours. The present result suggest, that grazing animals can be manipulated to help in rehabilitation of degraded marginal lands.

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Table 1
Seed number of different legumes transferred by animal faeces to a target pasture at Battajeck, north Syria during four days of grazing in October 1995 and legume plants recorded in April 1996 on the same pasture.

	Seeds[1]/m^{-2}		
Species			
Trigonella monspeliaca L.	236.0a		
Trifolium campestre Schreb.	114.8b		
T. tomentosum L.	62.2d		
T. purpureum Loisel.	78.2c		
T. haussknechtii Boiss.	11.9e		
T. angustifolium L.	0.2f		
T. lappaceum L.	8.6f		
T. pilulare Boiss.	0.8f		
T. stellatum L.	2.7f		
T. resupinatum L.	3.8f	**Day of grazing**	
Medicago rigidula (L.) Desr.	2.2f	1	15.7d
M. rotata Boiss.	0.2f	2	35.0c
M. noeana Boiss.	3.1f	3	60.8a
others	0.3f	4	38.5b
SEM	2.79 (48 obs. per mean)		0.79 (168 obs. per mean)

	Legume plants[1]/m^{-2}		
Species			
Trigonella monspeliaca L.	91a	**Day of grazing**	
T. tomentosum L.	16b	1	14
T. resupinatum L.	4bc	2	12
T. campestre Schreb.	1c	3	55
T. purpureum Loisel.	1c	4	10
SEM	5.2 (20 obs. per mean)		4.2 (25 obs. per mean)

1. Values on the same column followed by different letter (s) are significantly different (P<0.01)

Figure 1
Cumulative percent recovery of *Trifolium campestre* (•), *T. tomentosim* (O), *Medicage rigidula* (■) and *Hippocrepis unsiliquosa* (□) seeds with time, following ingestion by sheep (Bar represents LSD 1% level at maximum recovery)