PASTURE IMPROVEMENT STUDIES OF THE TAURUS MOUNTAINS DEVELOPMENT PROJECT IN TURKEY

T. Tukel, V. Tansi, T. Polat, A. Disbudak and E. Hasar
Field Crops Department of Agricultural College of Çukurova University, 01330 Adana, Turkey

ABSTRACT
The grazing lands of the Taurus Mountains Project Area are subject to heavy, uncontrolled grazing pressure, gradually decreasing forage production capacities. These common grazing areas are located within the forest belt between 600 m and 1300 m elevation. Such lands are usually close to the villages and near the cultivated fields. A sedentary grazing system is being practised. There is practically no concern of the basic principles of the pasture management in the selected villages. This study was carried out to introduce the basic principles of pasture management and to demonstrate rapid fertilization effects on common grazing lands of the selected villages. The study showed that protection from heavy grazing pressure has produced a twofold forage yield as well as stocking capacities in all of the investigated pastures. Positive fertilization effect was not so great as for the protection in the lower elevated pastures. However, at the higher elevated pastures stocking capacities seemed to be better affected by fertilization.

KEYWORDS
Pasture management, improvement, Taurus mountains, Turkey

INTRODUCTION

The grazing lands of the Taurus Mountains Project Area are subject to heavy, uncontrolled grazing pressure, and the forage production capacities of these lands are gradually decreasing. The reason for this retrogressive trend includes a complex mixture of several interrelated problems of socio-economic, judiciary, political and technical inadequacies (Tükel and Hatipoglu, 1996). In spite of this decrease in production, these lands are still providing most of the forage needs of the livestock raised in this region. For example, six villages of the studied area have about 2742 head of cattle, 7542 head of sheep and 9804 head of goats. These animals receive very little feed except grazing. These common grazing areas of the sampled villages are located within the forest belt between 600 m. and 1300 m. elevation. They are not officially licensed grazing lands but are actually remnants of cleared forests. Some of the very steep lands of this type are already reserved and protected by the forest service for reestablishment of forest. No grazing is allowed within them. Some of the less steep lands, however, are being used as common grazing areas by the villagers. Such lands are usually close to the village and near the cultivated fields. On these common grazing lands, a sedentary grazing system (Yalçìn, 1986) is being practised since the first settlement of the villages. Livestock also have access to stubbles and fallow fields. There is practically no concern of the basic principles of pasture management in the selected villages. Under such conditions, the first and, perhaps, the most important step for the application of the management principles is to establish proper exclosures and regularly monitor the production potential and the utilization capacity of the pastures in question. In addition, demonstration of rapid improvement techniques such as fertilization effects have utmost importance under such sedentary grazing system. By doing so, the farmers using these pastures will likely be introduced to the basic management principles as well as rapid improvemet techniques in the region.

METHOD

Several visits to the previously selected villages Kiralan , Kokez, Çukurbag, and Yukaribelemedik with elevations about 600, 800, 1300 and 1300m. respectively, were made during the growing periods each year. Lower elevations having higher precipitation, mild winters but hot summers under influence of the mediterranean climate. In each village common grazing areas, four exclosures (6 m X 8 m) replicated four times were randomly set up in 1991. Each exclosure was divided into 1 m square grids. The first ten grids were devoted to sampling procedures of monitoring yearly production potential of the pastures sampling from these grids gave the results of the ungrazed and unfertilized treatments in the tables. Ten other grids were reserved for determining long term effects of protecting vegetation from grazing. The results obtained from these grids were presented as the ungrazed treatmens in the tables. Another ten grids in the exclosures were also reserved for a standard applications of pasture fertilization practices for the last two years of the project duration. The results from these grids were given as the grazed and fertilized treatments in the tables. The same amounts of the grids set in the close vicinities of the exclosures were also designated in order to monitor the effects of the above mentioned applications as for the grazed treatments.

80 kg. nitrogen and 80 kg P2O5/ha were applied in fall of 1992, then, the split application of nitrogen (45 kg/ha) was performed in spring of 1993. In the following years a spring application (45 kg nitrogen/ha) was performed due to unexpected personal problems. By the end of each growing season, all plants in the square meter grids both inside and outside of the exclosures were clipped at ground level and separated into components as grasses, legumes, and other forbs. All samples were dried at 70° C for 24 hours. Production potential and the utilization of the pastures were then determined from the dried samples. The simplified equations of Cornelius and Alìnoglu (1962) were used to determine the stocking capacities.

RESULTS AND DISCUSSION

Forage yields and utilization. Forage production of the grazing lands in the first year (1990-1991) ranged between 0.9-1.8 tonnes /ha dry forage (Table.1). The second year's production figures from the continuously grazed pastures of the villages followed more or less a parallel line. However, fencing out small portions of the pastures in the second year showed a visible forage production increase. This is, of course, an expected result due to the fact that lower elevated villages receive higher amounts of precipitation during the year. In addition, the disturbed nature due to plowing and continuously grazing of the pastures in the past, especially in Kiralan and Kokez, may also be another cause of the high forage production in these lower elevated villages. It appears that these pastures also indicate an early state of the secondary succession after such disturbances.

Dry forage yields of the investigated villages in the third year were sharply increased as a result of full application of nitrogen and phosphorous in both grazed and ungrazed areas (Table 1). The increase was very obvious in the combined treatments of protection from grazing and fertilization. Heavy utilizations (about 87 % in Kokezand 59 % in Kiralan in the third year) seemed to have a nullifying effect of fertilization in Kiralan even reducing it in Kokez.

The dry forage yields of the investigated pastures in the fourth year were not as high as in the third year. Even the combined effect of protection and fertilization were not so high. It appears that two reasons may cause this. First of all, only spring nitrogen fertilization was realized but not the fall application of P_2O_5 together with nitrogen. Secondly utilization percentages were quite high particularly in the

pastures of KIRALAN (64 %) and ÇUKURBAG (74 %), so that the positive effects of fertilization were obscured by the heavy grazing (Table 1).

Carrying capacity. The effects of protecting from grazing together with fertilization on dry forage yields were similarly reflected on the carrying capacities of the investigated villages (Table 2). Protection from heavy grazing pressure produced a twofold increase of stocking capacities in all of the investigated pastures. On the other hand, positive fertilization effect was not so great as for the protection. However, stocking capacities at the higher elevated pastures such as in Çukurbag and Yukabibelemedik seemed to be better affected by fertilization.

Plant species found. Plant species diversity found in the investigated village pastures were quite rich.About 83 species were identified including 19 grasses, 39 legumes and 25 other forbs.

ACKNOWLEDGEMENTS

Thanks go to the International Center for Agricultural Research in Dry Areas (ICARDA) for their support and close collaboration in the course of conducting this research.

REFERENCES

Anonymous, 1961**.** Türkiye Jeolojik Haritasy. Harita Genel Müdürlügü (Turkish Geologic Map, General Directorate of Cartography, in Turkish).

Cornelius, R.D. and N. Alìnoglu. 1962. Vejetasyon Ölçme Methodlary ve Otlatma Kapasitesi Tayini. Türk Tarym Bakanlyðy Mesleki Kitaplar Serisi D-66 (Methods for measuring vegetation and grazing capacities, Turkish Ministry of Agriculture, Vocational Books Series D-66, in Turkish).

Tükel, T. and R. Hatipoglu. 1996. Turkish grazinglands: Causes for misuse and likely measures of preventing degradation. Int. Conference on Land Degradation, 10-14 June 1996, Adana-Turkey, Programme Abstracts and Excursions, pp: 53.

Yalçìn, B.C. 1986. Sheep and goats in Turkey. FAO Animal Production and Health Paper No. 60, Rome.

Table 1

Dry Forage Yields (tonnes/ha) of the Taurus Mountains Project

Years	Kìralan			Kokez			Cukurbag			Y.Belemedik		
	UG	G	Mean	UG	G	Mean	UG	G	Mean*	UG	G	Mean*
1990-91	1.8			1.1			0.9			1.0		
1991-92												
Unfert.	2.7	1.5	2.1	2.3	0.9	1.6	1.5	1.0	1.3	1.4	0.9	1.2
Util.(%)	45			58			34			35		
1992-93												
Unfert.	4.4	2.1	3.3	1.9b	0.3c	1.1	2.8	2.2	2.5b	2.2	0.9	1.6b
Fert.	5.7	2.1	3.9	2.9a	0.3c	1.6	5.0	3.6	4.3a	4.5	2.7	3.6a
Mean+	5.1a		2.1b	2.4a		0.3b	3.9a		2.9b	3.4a		1.8b
Util.(%)	59			87			26			45		
1993-94												
Unfert.	1.5	0.5	1.0	1.6	1.3	1.5	1.6	0.4	1.0	- - -		
Fert.	1.9	0.7	1.3	1.8	1.4	1.6	2.4	0.6	1.5	- - -		
Mean+	1.7a		0.6b	1.7		1.4	2.0a		0.5b	- -		
Util.(%)	64			19			74			-		

*Means in the same column within the village followed by different letters are significantly different at the level of $p<0.05$ on the basis of t-test

+ Means in the same row within the village followed by different letters are significantly different at the level of $p<0.05$ on the basis of t-test

UG: Ungrazed G: Grazed

Table 2

Sheep or Goat Stocking Capacities of the Investigated Villages Grazing Lands (On the basis of 1 AU= 250 kg live weight and 90 days grazing period)

Villages	Years	Au/ha				Sheep Number/ha			
		UG	G	F	UF	UG	G	F	UF
KIRALAN									
	1991	-	1.6	-	-	-	11	-	-
	1992	2.4	1.3	-	-	17	9	-	-
	1993	4.5	1.8	3.4	2.9	31	13	24	20
	1994	1.5	0.5	1.1	0.9	10	4	8	4
Mean	2.8	1.30	2.3	1.9	19.3	9.3	16.0	12.0	
KÖKEZ									
	1991	-	1.0	-	-	7	-	-	
	1992	2.0	0.8	-	-	14	5.5	-	-
	1993	2.1	0.3	1.4	1.0	15	2	10	7
	1994	1.5	1.2	1.4	1.3	10	8	10	9
Mean	1.7	0.8	1.4	1.2	13.0	5.6	10.0	8.0	
ÇUKURBAG									
	1991	-	0.8	-	-	-	5.5	-	-
	1992	1.4	0.9	-	-	10	6	-	-
	1993	3.5	2.6	3.9	2.2	24	18	27	16
	1994	1.8	0.5	1.4	0.9	12	3	9	6
Mean	2.2	1.2	2.7	1.6	15.3	8.1	18.0	11.0	
Y.BELEMEDIK									
	1991	-	0.9	-	-	-	6	-	-
	1992	1.2	0.8	-	-	8	5.5	-	-
	1993	3.0	1.6	3.2	1.4	21	11	22	10
	1994	-	-	-	-	-	-	-	-
Mean	2.1	1.1	3.2	1.4	14.5	7.5	22.0	10.0	

1 AU= 7 sheep or goats UG: Ungrazed G: Grazed

F: Fertilized UF:Unfertilized