

Response of annual medics to chemical fertilization

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ABSTRACT

The effect of complete fertilizer (12-24-12) use on forage yield and yield components of cultivars of annual medics was studied in a field experiment which was conducted on the Farm of the Faculty of Agriculture, Tripoli, Libya, during the season 1982-83. The fertilizer application resulted in marked increase in forage production and plant height of all cultivars under trial.

INTRODUCTION

There is a tremendous potential for increasing livestock production and greater water use efficiency in range areas by using fertilizers (9). Northern regions of Libya have considerable potential for fodder production as evidenced by wide spread distribution of annual medics in the area (3). Moreover, *Medicago littoralis*, *M. truncatula* and *M. tornata*, have been reported to be very useful in the near coastal region of Libya (8).

Experience with sown *Medicago* species showed that the yield of these, is closely associated with fertilizer use which affects the establishment and growth of the crop (2, 4). Some workers tested the individual effects of N, P and K on legume production (1, 7). However, there are some reports to show that the combined application of N, P, and K increase the hay yield by several times as compared to the individual effects of these elements (6, 10, 11, 12). But no significant effort has been made to test the combined effect of NPK on annual legumes under Libyan conditions.

In view of these considerations, the present experiments were conducted to study the response of some cultivars of annual medics to complete fertilizer as a combined source of NPK.

MATERIALS AND METHODS

A field experiment was conducted on the Farm of the Faculty of Agriculture, Tripoli, Libya, during the season 1982-83 to study the effect of complete fertilizer (12-24-12) as a combined source of NPK on the herbage yield and other growth parameters of three cultivars of annual medics viz: *Medicago tornata* cv. Swani, *M. truncatula* cv. Cyprus and *M. littoralis* cv Harbinger. Each cultivar was grown with and without the application of fertilizer. Thus the following six treatments were made.

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Treatment:

- No. 1: Swani sown without fertilization.
- No. 2: Swani sown with fertilization.
- No. 3: Cyprus sown without fertilization.
- No. 4: Cyprus sown with fertilization.
- No. 5: Harbinger sown without fertilization.
- No. 6: Harbinger sown with fertilization.

The whole experimental area was divided into three blocks, where in each block, the treatments were randomly assigned to 2×2 m plots. Thus the two way lay out with interaction was followed (5).

The crop was sown in November, 1982. The seeds of each cultivar were sown at the rate of 10 Kg/ha. The fertilizer was applied at seeding time at the rate of 300 Kg/ha. No irrigation was applied and the crop was grown under natural rainfall conditions.

Five plants were sampled at random from each plot at the time of harvest for measuring plant length and recording green and dry weight. All plots were harvested on March 27, 1983. The fresh green forage of each plot was weighed immediately after harvesting in the field. Samples from each plot at harvest were saved and then oven dried at 70°C for 24 hours and calculated for dry forage in tons per hectare. The data for all parameters were subjected to analysis of variance (5).

RESULTS AND DISCUSSION

Forage yield and yield components of annual medics as affected by fertilizer application is presented in Table 1. The results given in Table 1, revealed the significant effect of fertilizer application and cultivars separately and together in the form of interaction on green forage production. The green forage yield was 3.86 and 3.23 tons with and without fertilizer application, respectively. Swani, Cyprus and Harbinger gave 3.61, 2.97 and 4.04 tons/ha of green forage, respectively. A significant interaction was also observed between fertilizer application and cultivars. The highest green forage yield (4.69) and lowest (2.75) tons/ha were obtained from Harbinger and Cyprus with and without fertilizer application, respectively. The same trend was found with dry forage yield per hectare. The average dry forage yield was significantly increased by applying fertilizer. The highest (0.85) and lowest (0.70) tons/ha mean dry forage yield was obtained, respectively with and without applying fertilizer. The dry forage yield was significantly affected by cultivars Harbinger and Cyprus gave the maximum (0.91) and minimum (0.66) tons/ha of dry forage respectively.

The green forage per plant was significantly increased by fertilizer application. But there were no significant differences among the cultivars for their green forage yield per plant. However, fertilizer $\times$ cultivars interaction had significant effect on green forage production per plant as seen in Table 1. The average green forage yield per plant was 12.15 and 10.94 grams with and without fertilizer application, respectively. The maximum (13.55) and minimum (10.11) gram mean green weight of a plant was recorded in Harbinger with and without fertilizer application, respectively. Similarly dry forage per plant as indicated in Table 1, was also significantly affected by fertilizer application, whereas there were no significant differences among the cultivars for their dry forage per plant. However, fertilizer and cultivar interaction had a significant effect on dry forage of individual plants. The highest (2.95) and lowest (2.40) grams dry weight per plant was obtained in Harbinger and Swani with and without fertilizer application, respectively.

According to Table 1, there were significant differences among the cultivars for their plant height. Fertilizer application resulted in increased mean plant height significantly in all three cultivars. The interaction (Fertilizer $\times$ cultivar) effect was also found significant. Without fertilizer application, the mean plant height was only 23.40 cm. which increased to 27.58 cm. as a result of applying fertilizer. The average maximum (30.30 cm.) and minimum (22.73 cm.) plant height was obtained in plants of Cyprus and Swa-

Table 1 — Forage yield and yield components of cultivars of annual medics as affected by compound fertilizer (12-24-12).

	Forage yield (Tons)/ha						Forage yield (Grams)/Plant						Plant height (Cm.)		
	Green yield			Dry yield			Green yield			Dry yield			F ₀	F ₁	Mean _a
	F ₀	F ₁	Mean _a	F ₀	F ₁	Mean _a	F ₀	F ₁	Mean _a	F ₀	F ₁	Mean _a			
Swani	3.54	3.69	3.61	0.69	0.78	0.74	11.43	11.93	11.68	2.40	2.54	2.47	23.53	21.93	22.73
Cyprus	2.75	3.19	2.97	0.59	0.74	0.66	11.28	10.97	11.12	2.42	2.53	2.47	25.13	35.47	30.30
Herbinger	3.39	4.69	4.04	0.81	1.02	0.91	10.11	13.55	11.83	2.41	2.95	2.68	21.53	25.33	23.43
Mean _b	3.23	3.86		0.70	0.85		10.94	12.15		2.41	2.68		23.40	27.58	
L.S.D. (0.05) for Fer. use	0.17			0.05			1.12			0.24			2.41		
L.S.D. (0.05) for Cul.	0.21			0.06			—			—			2.95		
L.S.D. (0.05) for Interaction (Fer. × Cul.)	0.30			—			1.95			0.41			4.17		

Mean_a and Mean_b stand for cultivar and fertilizer mean respectively
 F₀ and F₁ stand for Non Fertilized and Fertilized respectively

ni, respectively when the cultivars were compared with one another. But under an interaction effect, Cyprus when fertilized and Harbinger when not fertilized, gave the maximum (35.47 cm.) and minimum (21.53 cm.) plant height, respectively.

Each individual plant nutrient is assumed to play a specific role in the growth of the plant. The essential nutrients like N, P and K have far-reaching effects on the forage yield when applied alone or together. Nitrogen is often the first limiting factor in the growth of forages, but the efficiency with which it can be utilized is very much dependent upon the presence of adequate quantities of other elements (13).

Abundant evidence exist that successful forage production requires an adequate supply of all the essential elements at a time. These results are in close agreement with the findings of Konstantinova (6), Russell and Ohlrogge (11), Ruter (10) and Saciragic and Dzanic (12) who also obtained high yields of annual and perennial mediterranean medics under the combined effect of NPK.

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استجابة نباتات النفل الحولية للتسميد

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المستخلص

ان تأثير التسميد الكامل (12-24-12) على الانتاجية العلفية ومحتوى الانتاج لنباتات النفل الحولية تمت دراستها في الحقل بمزرعة كلية الزراعة / جامعة الفاتح خلال فصلى 1982 — 1983 م. ومن خلال عمليات التسميد تم الحصول على زيادة ملحوظة في الانتاجية العلفية وطول النبات لكل الأنواع النباتية المستعملة.