

Effect of seeding rate on the forage yield and yield components of *Medicago littoralis*, cv. Harbinger

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ABSTRACT

The effect of seeding rate on the forage yield and yield components of *Medicago littoralis*, cv. Harbinger was studied during 1982-1983 at the Faculty of Agriculture Farm, Tripoli, Libya.

Forage yield and number of plants on hectare bases were increased significantly by increasing the seed rate, whereas individual plant forage yield was decreased significantly by increasing the seeding rate. The plant length also was increased by increasing seed rate but this increase was non significant. The maximum forage yield of 9.56 and 2.92 tons/ha, on fresh green and oven dried weight bases, respectively were obtained with a seeding rate of 20 Kg/ha and the lowest yield 5.34 and 0.92 tons/ha of fresh and oven dried forage, respectively with a seeding rate of 5 Kg/ha.

INTRODUCTION

Medicago littoralis Rhode (Strand medic) cv. Harbinger under trial was originated by CSIRO, Australia (2). This species was also found to be most widely distributed in Tripolitania and was represented by 70% in medic samples collected by Francis in 1978 who reported that its wide spread distribution was favoured by its adaptation to sandy soil types which dominated the soil types in Tripolitania. It also successfully colonized all major rainfall belts even down to 50 mm isohyete (4). This medic cultivar was also considered the most important pasture forage crop for Libyan range lands not only due to its ecological adaptation, but based on its potential merits like high production of dry matter, high nutritive value, a significant source of soil stability, fertility, cheap establishment and maintenance costs (3, 5, 6, 10). Australian experts tried some annual medics for cereal/medic rotation in the Gefara Plain as the bases of dry land farming system in the region. Harbinger and Cyprus were found more successful (5, 6). But no significant attempt was made to test this important cultivar for different seeding rate.

Seeding rate is one of the most important factors affecting the growth and forage yield of medics and other legumes. As compared to other legumes, there is very limited work available with annual medics. Amor (1) obtained 4.4, 29.60 and 32.10 Cwt/acre DM yield from Harbinger medic and 3.40, 29.80 and 29.70 Cwt/acre DM yield from Cyprus barrel medic in Spring of 1962, 1963 and 1964, respectively by using a seeding rate of 30 lbs/acre. In another trial of agronomic evaluation of annual medics, Poole (8) recorded dry matter yield as 1468, 1609 and 1685 lbs/acre from Tornafield, Harbinger and Jamalong, respectively by sowing 6.0 lb/acre. This yield increased to 2131,

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2092 and 2121 lbs/acre for Tornafield, Harbinger and Jamalong, respectively as the seeding rate was increased to 60 lb/acre. The same trend for number of plants per unit area was observed by Poole (8). Rudd (11) established Harbinger and Jamalong barrel medic at different 12 sites by using a seed rate of 22 Kg/ha which gave 174 to 1284 Kg/ha dry matter whereas Radwan et al (9) reported DM yield as 2.52, 2.09 and 4.38 tons/ha from Australian Jamalong and snail and local *Medicago polymorpha*, respectively by using 8 to 12 Kg/ha seed rate. Ruegg and Alston (12) obtained 58.35 gr. dry matter per pot containing 10 seedlings, whereas Pederson (7) noted a trend towards decrease in forage yield of individual plants of *Medicago* species with increasing seed rates. He also observed that the individual plants were of short height in thinned stands of the crop.

The present study was conducted to investigate the effect of the seeding rate on forage yield and yield components of *Medicago littoralis* cv. Harbinger.

MATERIALS AND METHODS

A field experiment was conducted during 1982-83 using the cultivar harbinger at the Faculty of Agriculture Farm, Tripoli, Libya. A randomized block design with three replicates and four treatments was used as follows,

Treatment	Seeding Rate (Kg/ha)
1	5
2	10
3	15
4	20

The crop was sown in November, 1982. The seed was broadcast in 2 × 2 M plots. Three hundred Kg/ha of 12-24-12 fertilizer was applied in two equal amounts at planting time and preflowering stage, respectively. The crop was grown under dry land conditions.

Five plants were sampled at random from each plot at harvest for measuring plant length and recording yield components data. The whole plots were harvested on March, 1983. The fresh green forage of each plot was weighed immediately after harvesting. Samples of each plot at harvest were saved and then oven dried at 70°C for 24 hours and calculated for dry matter in tons/ha. All the data were subjected to statistical analysis (13).

RESULTS AND DISCUSSION

The total forage yield (tons/ha) on green weight bases as well as oven dried weight is presented in Table 1. From the statistical analysis of the green weight as well as dry weight, it was found that the forage yield of Harbinger was significantly affected by the seeding rate. The treatment mean differences were also found highly significant. The data of Table 1 indicated that the highest (9.56 tons/ha) and the lowest (5.34 tons/ha) forage on green weight bases were obtained with seeding rates of 20 and 5 Kg/ha, respectively, whereas the maximum (2.92 tons/ha) and minimum (0.92 tons/ha) mean oven dried forage was obtained with seeding of 20 and 5 Kg/ha, respectively. Forage yield was found directly related to seeding rate. This increased as the seeding rate increased. Results of the same nature were reported by Poole (8) who obtained 1468, 1609 and 1685 lb/acre dry matter from Tornafield, Harbinger and Jamalong by using 6 lb seed per acre. He recorded 2131, 2092 and 2121 lbs/acre dry matter yield from the same Tornafield, Harbinger and Jamalong respectively by increasing the seed rate to 60 lb/acre.

The average number of plants/ha was increased significantly by increasing seed rate.

Table 1 — Effect of seeding rates on forage yield and yield components of Harbinger (*Medicago littoralis*)

Seeding Rate Kg/ha. ± SD	Average Fresh Green Weight Tons/ha. ± SD	Average Oven Dried Weight Tons/ha. ± SD	Average Plant Number/Plot ± SD	Average Fresh Green Weight Grams/Plant ± SD	Average Oven Dried Weight Grams/Plant ± SD	Plant Length (Cm./Plant) ± SD
5	5.34 a ±0.55	0.92 a ±0.13	883.33 a ± 11.54	60.0 a ±0.29	10.4 a ±0.01	16.86 a ±2.01
10	6.18 b ±0.17	1.33 b ±0.05	1286.66 b ± 23.09	4.84 b ±0.08	1.03 a ±0.04	17.06 a ± 3.99
15	6.67 c ±0.23	1.90 c ±0.09	1976.66 c ± 89.63	3.40 c ±0.35	0.96 a ±0.10	18.90 a ± 3.99
20	9.56 d ±0.21	2.92 d ±0.05	3073.00 d ± 21.65	2.70 d ±0.31	0.82 a ±0.09	19.13 a ± 3.06

Any two averages not having the same letter are significantly different at P = 0.05 level

Like forage yield, the number of plants/plot was also found directly related to seeding rate which in general increased with an increase in seeding rate (Table 1). Therefore, seeding at 20 and 5 Kg/ha gave the maximum (3073) and minimum (883.33) mean number of plants per hectare, respectively. The number of plants has profound effects on the forage yield because at higher seed rate, more plants are established which cause an increase in the forage production. The same conclusion was drawn by Poole (8).

On an individual plant basis, the fresh green and oven dried weight decreased with an increase in seeding rate. The fresh green forage yield per plant was significantly affected by the seeding rate whereas oven dried forage per plant was non significantly affected by the seeding rate. From Table 1, which pertained the average values of individual plant yield, it can be noted that 5 Kg/ha seeding rate gave the maximum (6.00) and (1.04) grams of fresh green and oven dried forage per plant, respectively, whereas 20 Kg/ha seeding rate gave the minimum (2.70) and (0.82) grams of fresh green and oven dried forage, respectively. The results obtained are in close agreement with those reported by Pederson (7) who found less productive plants of *Medicago* species in dense stands.

The plants length increased with an increase in seeding rate (Table 1). Like oven dried weight per plant, the plant length was also not significantly affected by seeding by rate. The data of average plant length given in the table, showed that the highest (19.13) and lowest (16.86) cm. plant length were recorded in the plants established by 20 and 5 Kg/ha seeding rate, respectively. The plants in dense stands attained more length. the same tendency was also reported by Pederson (7). From these studies, it may be recommended that 20 Kg/ha seeding rate will lead to higher production of *Medicago littoralis* cv. Harbinger.

LITERATURE CITED

1. Amor, R.L. 1966. *Herbage and seed production of three barrel medic (Medicago truncatula) cultivars and harbinger medic (Medicago littoralis) in the Victorian Mallee*. Aust. J. Exp. Agr. Anim. Husb. 6: 361 - 364.
2. Barnard, C. 1972. *Register of Australian herbage plant cultivars: 201 - 202* Division of Plant Industry, CSIRO, Australia.
3. Dumancic, D. 1979. *Results of sowing Medicago species and other range plants for range improvement in Bir Al-Ghanam grazing perimeter*. Secretariat of Agriculture Reclamation and Land Development, Gefara Plain Authority, S.P.L.A.J.: 1 - 12.
4. Francis, C.M. 1978. *The distribution and ecology of annual Medicago species in North-West Libya. A report based on plant collection tour*. Aust. Plant Introduction Reviews: 13: 3 - 14.
5. Halse N.J. 1978. *An evaluation of the Libyan cereal project as an example of Australian agricultural expertise overseas*. J. Aust. Inst. Agr. Sci. 44: 92 - 96.
6. Halse, N.J. 1982. *Annual inspection visit to cereal project, Libya*. Report for 1981/82: 1 - 7.
7. Pederson, M.W. 1962. *Alfalfa seed production studies*. Utah Agr. Exp. Sta. Bull. No: 436.
8. Poole, M.L. 1970. *An agronomic evaluation of Medicago tornata cv. Tornafield, a new medic cultivar*. Aust. J. Exp. Agr. Anim. Husb. 10: 405 - 409.
9. Radwan, M.S., A.K. Al Fakhry and A.M. Al-Hasan 1978. *Some observations on the performance of annual medics in Northern Iraq*. Mesopotamia J. Agr. 13: 55 - 67.
10. Roberts, E.J. and N.J. Halse 1976. *Introduction of a cereal/medic rotation in the Gefara Plain of the Libyan Arab Republic*. Agr. Develop. Council. S.P.L.A.J: 1 - 18.
11. Rudd, C.L. 1972. *Response of annual medic pasture to superphosphate applications and the correlation with available soil phosphate*. Aust. J. Exp. Agr. Anim. Husb. 12: 43 - 48.

12. Ruegg, J.J. and A.M. Alston 1978. *Seasonal and diurnal variation of nitrogenase activity (Acetylene reduction) in barrel medic (Medicago truncatula Gaertn) grown in pots.* Aust. J. Agr. Res. 29: 951 - 962.
13. Steel, G.D. R. and J.H. Torrie. 1960. *Principles and procedures of statistics.* McGraw-Hill Book Co. Inc. London: 99 - 131.

تأثير معدل البذر على انتاجية ومحتوى الانتاج لنبات النفل

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المستخلص

إن تأثير معدل البذر على الانتاجية العلفية ومحتوى الانتاج لنبات النفل نوع هيربنجر تمت دراسته خلال الفترة ما بين 1982 م، 1983 م في مزرعة كلية الزراعة جامعة الفاتح. ومن خلال النتائج المتحصل عليها لقد وجد بأن الانتاجية العلفية وعدد النباتات لكل هكتار ازدادت زيادة معنوية وذلك بزيادة معدل البذر بينما تناقصت انتاجية النبات الواحد تناقصا معنويا بزيادة معدل البذر، كذلك وجد بأن طول النبات قد ازداد بزيادة معدل البذر ولكن هذه الزيادة كانت غير معنوية. إن الانتاجية العظمى للأعلاف الخضراء والمجففة كانت 2,92 - 9,56 ط / هـ على التوالي تحت معدل بذر 20 كيلوجرام / بينما أقل انتاجية وجدت تحت معدل بذر 5 كيلوجرام / هـ فكانت 5,35 - 5,92 طن / هـ من الأعلاف الخضراء والجافة على التوالي.