Pak. J. Bot., 20(1): 147—149, 1988.

NITROGEN EFFICIENCY OF EGYPTION CLOVER (*TRIFOLIUM ALEXANDRIANUM* L.)

AZRA SHAHEEN

National Agricultural Research Centre,
Pakistan Agricultural Research Council, Islamabad, Pakisan.

Egyption clover (*T. alexandrianum*) an important fodder crop of Pakistan is cultivated over an area of 0.820 million hectares (Iqbal, 1975). The plant plays an important role in soil fertility management through atmospheric N fixation (White *et al*, 1953). Nitrogen requirement of berseem is mostly considered to be met through biological nitrogen fixation, whereas its phosphoric needs through the application of phosphatic fertilizers. An increased phosphorus supply increases N fixation in subterranean clover by stimulating host plant growth and potassium supplied with initial dose of nitrogen enhanced the production (Petkov *et al.*, 1981, Robson *et al.*, 1981). The objective of the present study was to ascertain the effect of various fertilizer doses and inoculation on the yield of *Trifolium* for optimizing fodder yield.

A bulk surface soil sample (AP horizon) was collected from experimental farm of the National Agricultural Research Centre, Islamabad. Standard procedures as described by Richards (1954) were used to determine the physico chemical properties of soil (clay 17.16%, silt 30.6%, sand 52.24%, textural class loam, pH 7.2, ECe mmhos/cm at 25°C 0.885, organic matter % 1.22%, total N 0.05%, available-P 18 ppm, exchangeable-K 44 ppm). The experiment was performed in pots containing 8 kg soil arranged in randomized design with 3 replicates. Effective strain of *Rhizobium trifoli*, (obtained from NIFTAL Project University of Hawaii) was used with and without different doses of fertilizers in different treatments. Fifteen seeds of berseem (*T. alexandrianum*) were sown and after thinning 10 plants were allowed to grow per pot. Three plants from each pot were uprooted after 10 weeks and 15 weeks for nodulation. The plant material was dried at 80°C for 24 and total nitrogen content of nodules and of whole plants was determined by micro kjeldahl method (Mckenzie & Wallace, 1954). The data was statistically analysed using methods of Steel & Torrie (1980).

Effect of *Rhizobium* inoculation with and without different doses of NPK fertilizers on the dry weight and total N content in plants and nodules is given in Table 2. Nodules were observed in all the treatments but their frequency varied from treatment to treatment. Maximum number of nodules and maximum green fodder biomass and N-content were found in plants treated with 25:100:100 NPK kg/ha containing *Rhizobium* inoculum. Biomass although increased in other inoculated treatments as compared to un-inoculated treatments but inoculum alongwith NPK @ 25:100:100 kg/ha showed signigficant re-

Table 1. Treatment means of No, Wt. of nodules and N-content at different growth stages.

		No. of Nodules		Wt. of nodles (mg)		N-content (%)							
		2nd cut	3rd cut	2nd cut	3rd cut	1st cutting		2nd cutting		3rd cutting		4th cutting	
						Plant	Nodules	Plant	Nodules	Plant	Nodules	Plant	Nodules
Control	(T_1)	36 d	25 e	15.1 c	10.10 d	1.2 c	—	1.8 b	2.0 d	1.6 c	1.8 d	1.07 c	—
25 + 50 + 50 NPK kg/ha	(T_2)	55 c	48.6 d	35.7 b	35.40 c	1.8 b	—	2.0 b	3.0 c	2.1 b	2.9 c	1.90 b	—
T2 + Inoculum	(T_3)	85.0 a	110.0 a	44.2 b	49.40 b	2.4 a	—	2.5 ab	4.5 a	2.4 ab	3.50 b	2.0 d	—
25 + 100 + 50 NPK kg/ha	(T_4)	63.67 c	66.3 c	34.9 b	36.40 c	2.2 ab	—	2.5 ab	3.6 bc	2.1 b	3.0 c	1.97 b	—
T4 + Incoculum	(T_5)	77.0 b	57.0 d	39.6 b	38.53 c	2.4 a	—	2.8 a	4.0 b	2.7 a	3.4 bc	2.1 ab	—
25 + 100 + 100 NPK kg/ha	(T_6)	63.3 c	80.0 b	41.4 b	45.27 bc	2.1 ab	—	2.2 b	3.8 b	2.2 b	3.3 bc	1.93 b	—
T6 + Inoculum	(T_7)	88.3 a	113.0 a	58.5 a	64.27 a	2.5 a	—	2.8 a	4.9 a	2.7 a	4.0 a	2.38 a	—

sults with 2.8 and 4.9% N-content respectively in plants and the nodules. Nitrogen contents increased linearly with the increase in phosphorus levels (Azad *et al.*, 1978). Beneficial effect of phosphorus on the nitrogen fixing efficiency of legumes have been reported by Cassman *et al.*, (1981) and Hart *et al.*, (1981). Favourable response of potash to improve nodulation and nitrogen fixation by legumes has been observed by Idris & Sandhu (1983). It may therefore, be inferred that inoculation with effective *Rhizobium* strain improves the nitrogen economy of *T. alexandrianum* more than the use of nitrogen fertilizer.

References

Azad, M.I., M.S. Zia and R.K. Ahmad. 1978. Effect of phosphorus and seed inoculation on nitrogen fixation by berseem in various textured soils of Faisalabad. *Pak. J. Agri. Res.*, 1: 47-58.

Cassman, K.G., A.S. Whitney and R.L. Fox. 1981. Phosphorous requirements of soybean and cowpea as affected by mode of N nutrition. *Agron. J.*, 73: 17-22.

Hart, A.L., D.J. Jessop and J. Galpin. 1981. The response of phosphorus of white clover and lotus inoculated with Rhizobia or given KNO_3. *N.Z.J. Agric. Res.*, 24: 27-32.

Idris M. and G.R. Sandhu. 1983. The effect of potash fertilizer on the yield and N_2 fixing efficiency of Chickpea (*Cicer arietinum* L). *Potash Review*, IPI Bern/Switzerland (in press).

Iqbal, M. 1975. *Effect of NPK treatments on the yield and quality of berseem fodder*. M.Sc. Thesis West Pakistan Agricultural University, Lyallpur.

Mckenzie, H.A. and H.S. Wallace 1954. The Kjeldahl determination of nitrogen. A critical study of digestion conditions of nitrogen temperature, catalyst and oxidizing agent. *Aust. J. Chem.*, 7: 55-70.

Petkov, V., K. Todor and R. Veneta. 1981. Effect of raised nitrogen, phosphorus and potassium doses on their uptake and accumulation in alfalfa plant organs. RADEVA. (Fodder Inst. Pleven). *Fiziol Rast*, 7: 88-99.

Richards, A.L. 1954. *Diagnosis and improvement of Saline and Alkaline soils*, USDA Handbook No. 60.

Robson, A.D., G.W.O. Hara and L.K. Abbott. 1981. Involvement of phosphorus in nitrogen fixation by subterraneun clover (*Trifolium subterraneun*) cultivar Seaton Park. *Aust. J. Plant Physoil.*, 8: 427-436.

Steel, R.G.D. and J.H. Torrie. 1980. *Principles and procedures of statistics*. McGraw Hill, Kogakusa Ltd., Tokyo, Japan.

Whyte R.O., G.N. Leissher and H.C. Trumble. 1953. *Legumes in Agriculture*. FAO, series No. 21, P-145.

(Received for publication 25 June 1986)