

## CHEMICAL COMPOSITION AND EVALUATION OF BERSEEM FODDER GROWN IN THE PUNJAB

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**Abstract.** Berseem samples were collected during March 1975 from 41 random sites of Multan, Sahiwal, Lyallpur, and Jhang districts of the Punjab. The chemical analyses indicated that on an average 17% samples contained less Zn and 37% samples less P required for growth of young animals. The Sahiwal district alone had 50% samples where P was not adequate for ruminant animals. It was also observed that in most of the samples where P was inadequate, Zn concentration in the plant was also marginal. The interaction of P and Zn should be considered before a judicious use of P is recommended for berseem.

Berseem (*Trifolium alexandrinum* L.) is an important fodder crop grown in the country and is cultivated in an area of 1.2 million acres annually.<sup>3</sup> It is very popular fodder crop due to its longer growth period (December-May), high palatability, high yield and protein contents. Besides a good source of animal feed, its role in the management of soil fertility through fixation of atmospheric nitrogen is well established.<sup>10</sup> Application of fertilizer especially phosphate has been reported to increase its yield.<sup>9,10</sup> However, the chemical composition, particularly micronutrient contents of the plant, has seldom been reported. The quality of the fodder primarily depends on its mineral content<sup>7</sup> that it supplies and could be affected by fertilization and soil conditions.<sup>4,7</sup> A knowledge of the mineral content of the plants growing in various parts of the Punjab would be of importance as regards the health of the animals that consume them.

### Materials and Methods

About 50 cm high plants growing in farmers' fields were sampled from different areas of the districts of Multan, Sahiwal, Lyallpur and Jhang during the second-week of March 1975. These samples were washed with deionized distilled water and dried in a forced air oven at 70°. Two-gram portions of the ground plant material were digested in HNO<sub>3</sub>-HOCl (5:1) acid mixture. Zinc, Cu, Fe and Mn were determined by atomic absorption spectrophotometer, Na and K by flame photometer, and P by spectrophotometer using Barton's reagent.

### Results and Discussion

The number of samples collected from each district and the chemical composition of the plant material with their range and average concentra-

tion are given in Table 1.

**Zinc and Cu Contents.** The average Zn concentration of berseem for the districts of Sahiwal, Multan, Lyallpur and Jhang was 27.5, 26.1, 24.9 and 22.1 ppm respectively and the mean for all the districts was 25.2 ppm. The average Cu concentration in the plants varied from 10.08 ppm in the Jhang district to 12.78 ppm in the Sahiwal district and the mean for all the districts was 11.6 ppm. Egan<sup>1</sup> has reported that 20 ppm Zn and 6 ppm Cu are the concentrations at which the requirement for growth of young sheep and cattle are expected to be met. On this basis, 17% samples were found to have less Zn and 7% sample had less Cu than necessary for the growth of young animals. Twenty one per cent of the samples from the Sahiwal district and 25% of the samples from Lyallpur were found to have an inadequate level of Zn.

**Potassium and Na Contents.** Average K and Na concentration in the dry matter of the samples varied from 3.11 (in Jhang) to 3.59% (in Sahiwal) and 0.61% (in Sahiwal) to 1.21% (in Lyallpur districts) and the mean for all the districts was 3.38 and 0.94% respectively. Marten and Andersen<sup>5</sup> reported that 0.8% K was the maximum ration requirement for ruminant animals. Raymond<sup>7</sup> reported that 0.13% Na in forage plants has been suggested necessary for high yielding dairy cows. The concentrations of K and Na in berseem samples and were all higher than the above values and more than adequate to meet ruminant requirement.

**Iron and Mn Contents.** The concentration of Fe for all the samples ranged from 143 to 1125 ppm and that of Mn from 18.7 to 71.2 ppm. The mean content in the plant was 446 and 48 ppm respectively. The figures for iron concentration appear to be high and may be due to some contaminations but for Mn the figures are quite comparable.<sup>2,5,8</sup>

**Phosphorus Contents.** The average phos-

TABLE 1. CHEMICAL COMPOSITION OF BERSEEM PLANTS COLLECTED FROM FARMERS' FIELDS.

District	No. of samples	Zn (ppm)	Cu (ppm)	Mn (ppm)	Fe (ppm)	P (%)	K (%)	Na (%)
Multan	16 Range average	17.25—48.50 (26.17)	4.5—23.75 (11.76)	42.5—66.2 (53.51)	143.7—1125.0 (504.3)	0.20—0.72 (0.36)	2.78—4.24 (3.49)	0.38—1.26 (0.80)
Sahiwal	14 Range average	7.0—41.0 (27.52)	2.5—17.5 (12.78)	18.75—70.0 (47.27)	250.0—987.0 (408.6)	0.08—0.45 (0.28)	2.78—4.42 (3.59)	0.12—1.01 (0.61)
Lyallpur	8 Range average	14.5—39.50 (24.93)	7.0—15.0 (11.81)	35.0—71.25 (47.97)	250.0—712.5 (494.5)	0.18—0.52 (0.34)	2.95—3.79 (3.31)	0.50—2.02 (1.21)
Jhang	3 Range average	17.25—26.50 (22.08)	5.0—13.75 (10.08)	27.5—62.5 (43.33)	325.0—425.0 (379.1)	0.20—0.42 (0.31)	2.98—3.20 (3.11)	0.76—1.64 (1.14)

phorus content in the samples from Multan, Sahiwal, Lyallpur and Jhang was 0.36, 0.28, 0.34 and 0.31% P in the dry matter respectively and the mean for all the districts was 0.31% P. These figures are near or slightly higher than the maximum required level of P (0.30%) for ruminant animals.<sup>5</sup> On an average 37% samples contained less than 0.3% P in their dry matter. In the Sahiwal 50% of the samples, in Multan 38% of the samples and in Lyallpur 25% of the samples did not contain adequate P for ruminant animals. This indicates the need for widespread application of phosphatic fertilizer for obtaining better quality feed of the crop. Furthermore, phosphorus response in green fodder yield has been widely reported in various field trials conducted in different parts of the Punjab.<sup>9</sup>

It is also observed (data not shown) that in most of the samples where berseem contained less than 0.30% P, it also contained less than 20 ppm Zn. If these soils are fertilized with phosphorus to get increased yield of the green fodder or P content in the plant, a decrease in the Zn concentration below the recommended level for ruminant animals may be expected either due to a growth dilution effect or a P-induced Zn deficiency.<sup>4,6</sup> Thus it would be advisable to evaluate these soils for their P and micronutrient contents especially Zn, before a judicious use of phosphatic fertilizers or Zn are recommended for berseem.

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