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Review Article:

Phosphate Fertilization of Crops
Part II – Major Millets, Cotton and Groundnut

by
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Maize: *Zea mays*, is reported to remove 114 lb. N, 43 lb. P_2O_5 and 125 lb. K_2O per crop of 35 cwt. of grain and 60 cwt. of straw. Similar to wheat, application of phosphatic fertilizers has been reported by almost all workers except Robinson (1950) and Hunter and Yungon (1955) to increase the yields of corn in India and abroad (Anon., 1949; Malavelta *et al.* 1953; Uangarderar, 1954; Sen and Kavitkarag, 1955; Genter *et al.* 1956, I. C. A. R., 1956 and Suarozda (Castro) and Rodrigues, 1958). To increase the yields further, Guttay and Steritzel (1957) tried presoaking the seeds in phosphatic solutions or mixing the seeds with phosphatic fertilizers and then sowing, and got beneficial results. Morsale (1957) tried three sprayings at 4 day intervals with 2·5 – 5% super with 0·4% potash and got increased yields and increased weight of grain. Scarseth (1950), Raheja *et al.* (1957), Robertson, *et al.* (1958) and Prummel (1958) reported that either placement or drilling were better than broadcasting while Baranov (1951) reported that broadcasting was as effective as row application. Robertson, *et al.* (1958) pointed out that deep placement of fertilizer was more effective in dry seasons than in wet seasons as the crop could make efficient use of the limited amount of available moisture in dry seasons due to extended root systems. Further, they have reported that in wet seasons or seasons with well distributed rainfall, broadcasting was more efficient and economical than placement. As rightly pointed out by them, the effect of placement of fertilizers depends on various factors like soil moisture, nature of fertilizers applied etc. Similarly, Glover (1953) and Corby (1957) advocated application of fertilizers in single dose while Baranovski (1956) and Sarishvite *et al.* (1956) advocated split dose application.

Malavolta *et al.* (1953), Forsee *et al.* (1954) and Webb and Pesek (1958) have reported beneficial effect due to the use of soluble phosphates in the early stages of crop growth while Anon. (1949), Guarderen Juan (1953) and Sarishvili *et al.* (1956) have stated that there was not much difference in the efficiency of different fertilizers. Webb and Pesek (1958) pointed out that efficiency of water soluble fertilizers decrease if they contain more than 60% in water soluble form. Artyukhov and Zolotov (1954) reported that the best results were obtained when the ratio of inorganic form: organic form was 1 : 2 in the mixture. So, the yields could be further pushed up if proper combination of water soluble and insoluble and organic and inorganic forms of fertilizers in the mixtures could be fixed up for different conditions under which the crop is grown.

Since the crop is fairly deep rooted and also since the crop absorbs phosphorus throughout the crop growth period and reproductive stage, as pointed out by Murdock and Engelbert (1958), it is essential to know the nutrient status of

sub-soil in addition to the surface soil and also use the tissue tests to know the needs of the crop as a guide (Bennel Stanford and Durratievil, 1953; Viets Nelson and Crawford, 1954).

In the studies on the influence of phosphatic fertilizers on the composition of crop, Jordan *et al.* (1950), Vangarder (1954), and Suarezda and Rodrigues (1958(have reported increase in P content of grain with no effect on other nutrients while application of nitrogenous fertilizers have been reported to increase P content but to decrease the nitrogen content.

Cholam (*Sorghum* sp.), **Ragi** (*Eleusine coracana*) and **Cumbu** (*Pennisetum typhoides*): Though *cholam*, *ragi* and *cumbu* are cultivated over large areas in India, not much attention seems to have been paid in increasing the yields of the above crops through application of phosphatic fertilizers. Only a few experiments have been reported by Dunton (1950), Painter and Leaner (1953), Singh (1957) and Raheja and Krantz (1958) on *cholam*, Venkatarao and Govindarajan (1956, 1958) and Sree Ramulu (1960) on *ragi* and Indira Raja and Sree Ramulu (1962), Sreenivasan (1961) and a few workers in Bombay (Anon., 1956) on *cumbu*. The lack of intensive work might have been possibly due to the fact that these crops are cultivated in majority of places as dry crops and also because of the notion that application of any fertilizer to a dry crop might not be economical.

Cotton (*Gossypium* sp.): This commercial crop has been reported to remove 75 lb. N, 30 lb. P_2O_5 and 78 lb. K_2O for every 350 lb. lint and 800 lb. of seed. Phosphatic fertilizers are applied every year either to the previous crop or to the cotton crop itself. While many workers abroad have reported beneficial results due to the application of phosphatic fertilizers Gracie and Evan 1949, James 1951, Mohamud Youssef Pasha 1951, Pisemskayal 1952, Popova 1954, Laudelout *et al.* 1954, Pack 1955, Vandecaveyer and Williams 1957, Singh 1957, Stelly and Morris 1959, Bennik 1959 almost all reports on experiments in India except those from Dharwar and Gadag (I. C. A. R. 1958) and also workers like Froier and Danell (1947), Hooter, Jordan *et al.* (1949), Nelson (1949), Beirker *et al.* (1957) have reported no response to application of phosphatic fertilizers. In the time of application experiment, Todorov and Neshina (1954) have reported best results by applying the last dose before the mass falling of scales. The reasons for the negative result in India has to be investigated thoroughly.

In the studies on the influence of phosphatie fertilizers on fibre length, quality etc., Froter and Danell (1947) reported that application of P fertilizer had no effect while Hooton, Jordan *et al.* (1949) and Maleina (1959) have reported that application of P fertilizer had increased the staple length. Not much work seems to have been reported in India on the above aspect.

Soil Tests: In assessing the nutrient status of cotton soils, Dastur (1959) advocates the use of tissue tests in preference to soil tests while Mikkelson (1955) reports soil tests bv Olsen's method to be the best for cotton soils.

Groundnut (*Arachis hypogaea* Linn): Groundnut removes about 80 lb. N, 22 lb. P_2O_5 and 54 lb. K_2O per cwt. crop. The yields of groundnut crop have been increased by the application of phosphatic fertilizers (Chausson and Ollognier 1954 Robinson and Honson 1951, Futral 1952, Prevot and Ollognier 1954, Bouyer 1958, Wheab and Muhammed 1958. Greenwood (1951) and Ferrand (1953) have pointed out that application of single super to be better than other forms because of the presence of calcium and sulphate in the fertilizer. Combinations of phosphatic fertilizers with ammoniun sulphate was reported to be better than other forms due to the presence of SO_4 in the fertilizer.

In the time of application experiment, Nye (1954) has reported that application of phosphates at the time of sowing to be better than application after 20 or 40 days. Though the above reports have proved the beneficial effects of phosphatic fertilizers not much work seems to have been done on the influence of phosphatic fertilizers on flowering of crop, shelling percentage of kernels, oil content of nuts etc,

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OBITUARY

We record with profound regret the demise of Sri R. Balasubramaniam, B. A., B. Sc. (Ag.), the Retired Principal of the Agricultural College and Research Institute. Born in 1900, he passed out of the College in the first batch of B. Sc. (Ag.) to be trained at the Coimbatore Agricultural College and entered service in the Department. He was promoted to the Madras Agricultural Service in 1936 and worked in various capacities as Cotton Specialist and Cotton Extension Officer. He acted as the Principal of the Agricultural College in 1953-'56 and during which time he was also the Ex-Officio President of the M. A. S. U. and retired in 1956. He has got many scientific publications to his credit on Cotton. He had contributed to the Cotton Monograph published by the I. C. C. C. and also the "Madras Cottons" to be published shortly by the State Government.

The M. A. S. U. deeply mourns the loss with the bereaved members of his family.