Table 3. Total uptake of nutrients (kg/ha) by pearl millet (mean of two years, 2010-11).

Treatments	Pearl millet N	P	K	S
Artoni, Site 1 (n=4*)				
T_1 (NPKS)	115	18.2	210	19.0
T_2 (-N)	67.7	11.1	163	10.3
T_3 (-P)	85.7	11.6	160	11.7
T_4 (-K)	101	14.9	170	14.6
T_5 (-S)	103	16.5	199	13.8
C.D. (p=0.05)	2.40	0.59	6.25	2.22
Panwari, Site 2 (n=4)				
T_1 (NPKS)	114	17.9	208	19.2
T_2 (-N)	69.8	11.3	140	10.4
T_3 (-P)	83.3	11.1	161	12.0
T_4 (-K)	99.8	14.7	167	14.8
T_5 (-S)	103	16.4	202	14.5
C.D. (p=0.05)	2.31	0.64	6.22	2.17
Nanpur, Site 3 (n=4)				
T_1 (NPKS)	114	18.0	208	18.7
T_2 (-N)	65.6	10.9	133	10.1
T_3 (-P)	85.8	11.5	161	11.9
T_4 (-K)	99.6	14.5	167	14.7
T_5 (-S)	103	17.0	200	14.3
C.D. (p=0.05)	2.61	0.67	6.40	2.09
Sahara, Site 4 (n=4)				
T_1 (NPKS)	115	17.9	209	19.3
T_2 (-N)	70.1	10.8	135	10.2
T_3 (-P)	87.8	11.4	166	12.1
T_4 (-K)	98.9	14.3	166	15.2
T_5 (-S)	101	16.4	204	14.8
C.D. (p=0.05)	2.25	0.55	6.14	2.11

*n = number of farmer fields in each site.

profit was obtained at site IV under ample NPKS treatment. The minimum net profit and B:C ratios were recorded under N omission treatment at site III.

Nutrient uptake followed trends similar to those observed for grain and stover yields (**Table 3**). The total uptake of nutrients was significantly influenced by the balanced application of nutrients. The maximum total uptake of N (114 to 115 kg/ha), P (17.9 to 18.2 kg/ha), K (208 to 210 kg/ha), and S (18.7 to 19.3 kg/ha) was recorded with the T_1 (NPKS) treatment, respectively. It was due to the fact that added nutrients increased the N, P, K, and S content in grain and straw of the crops due to no limitation of nutrients, which resulted in more uptake and higher yields. The highest average yield of 4.1 t/ha was obtained at a removal of 18 kg N, 2.1 kg P, 6.3 kg K, and 2 kg S per t of pearl millet grain yield. By comparison, the total uptake of nutrients under nutrient omission treatments decreased considerably, which suggests that limitation of one nutrient in the soil affects the uptake of other nutrients, again highlighting the importance of balanced fertilisation to crops. In general, the lowest total uptakes of N, P, K, and S were recorded under treatments omitting N, P, K, and S, respectively.

Summary

Results from our on-farm experiments clearly showed that N is the most limiting nutrient in the study area, followed by P, K, and S. The responses of nutrients varied widely across farmers' fields and years, which emphasised the need for site-specific nutrient management based on indigenous nutrient supply, yield target, and realistic estimation of achievable nutrient use efficiencies. Inadequate or no application of any limiting nutrient would reduce pearl millet yield and adversely affect the uptake and utilisation of other amply provided nutrients, further reducing yields. Balanced application of nutrients could double pearl millet yields from the current value with consequent increase in farmer profits. BCSA

Dr. Singh is retired Head of the Department of Agricultural Chemistry and Soil Science, Bichpuri College, Agra; e-mail: apsr_1999@yahoo.co.in and Dr. Majumdar is Director, IPNI South Asia Program, Gurgaon, Haryana, India; e-mail: kmajumdar@ipni.net

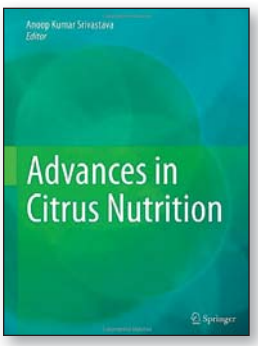
References

Dwivedi, B.S., D. Singh, A. Swarup et al. 2011. Indian J. Fert. 7(2):20-28.

FAI. 2010-11. Fertiliser Statistics, The Fertiliser Association of India, New Delhi

Gautam, R.C. 2005. *In* Rajendra Prasad (ed.) Textbook of Field Crops Production. Indian Council of Agricultural Research, New Delhi, pp. 198-213.

New Book: Advances in Citrus Nutrition by Dr. A.K. Srivastava



Despite many breakthroughs in the diagnosis and management of nutrient constraints, citrus nutritionists are still baffled by the complex processes associated with precise field diagnosis of different nutrient constraints. Currently available diagnostic tools are more applicable to next season's crop, instead of addressing the constraints in the current standing crop. However, there have been some distinctive developments in the recent past that appear to be quite promising in addressing these constraints. These developments include the application of geospatial tools including non-destructive proximal sensing, metalloenzymes through increasing involvement of genomics and metabolomics (e.g. expressed tag analysis), exploiting the dynamic relationship between soil enzymes and fertility variations etc. This book is a maiden effort to consolidate the information related to different aspects of citrus nutrition in a holistic manner. The book has 30 chapters written by 72 eminent researchers from 19 different countries and has been published by Springer-Verlag, Netherlands.

For more information, contact:
Dr. A.K. Srivastava
National Research Centre for Citrus,
Nagpur 440 010, Maharashtra, India
Email: aksrivas2007@gmail.com