Policy Brief

Efficient Potassium Management in Indian Agriculture

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The Fertiliser Association of India (FAI)
Trust for Advancement of Agricultural Sciences (TAAS)
International Maize and Wheat Improvement Center (CIMMYT)
Indian Council of Agricultural Research (ICAR)
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IPNI International Plant Nutrition Institute
FAI Ensuring Food Security
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Potassium (K) plays an important role in supporting many metabolic functions of plants that ensure high yields and quality of produce. However, application of adequate rates of K to crops and cropping systems is continuously being ignored because of a belief that Indian soils are well supplied with K. This undermined the fact that soils once rich in K decades ago could not sustain the continuous supply from native soil reserves unless replenished with external application. Also, recent evidence based on large soil testing initiatives under the National Soil Health Card Programme has revealed that areas where K soil test levels were high are now showing low K fertility. Therefore, unless addressed proactively, decreased K fertility of Indian soils can seriously jeopardize our food security and soil health.

Maintaining soil health, while meeting food demand is a major challenge. Hence implementing right strategies of K management needs immediate attention. To be effective, K application must follow the 4R Nutrient Stewardship Principles of selecting the Right Sources of K, applied at the Right Rate, at the Right Time, and at the Right Place. In addition, science-based application of K also provides opportunities to address both biotic and abiotic stresses, which are on an increase, due to climate change. Inadequate K availability in soils also have a direct bearing on human nutrition and health.

Potassium use in India contributes to less than 10% of the total fertiliser nutrient consumption. Moreover, in past, fertilizer policies have had a strong influence on K fertilizer use. On-farm scientific evidence across large geography and production systems suggest that present K fertilization practice is unsustainable. Accordingly, the policy decisions that directly influence on-farm implementation of balanced fertilization must be based on agronomic evidence. Else it may adversely affect future goals of sustainably producing more and quality food, doubling farmer income, and improving soil health.

In view of this, the International Plant Nutrition Institute (IPNI), The Fertiliser Association of India (FAI), Trust for Advancement of Agricultural Sciences (TAAS), International Maize and Wheat Improvement Center (CIMMYT), Indian Council of Agricultural Research (ICAR), and ICAR-Indian Agricultural Research Institute (IARI) jointly organized an International Conference on "Advances in potassium research for efficient soil and crop management" at NASC Complex, New Delhi, India on 28-29 August, 2017. The conference discussed the advancements in K science, frontier technologies, research gaps and extension needs. A panel discussion was part of the conference that discussed the need for evidence-based agronomic support on K fertilizer policy formulations. The two-day conference broadly addressed the three thematic areas as follows:

1. **Advances in potassium research**
2. **Advances in potassium: science to practices**
3. **Panel Discussion on potash fertilizer policy and evidence-based agronomy**

In all, 165 national and international delegates participated, representing researchers, policymakers, extension specialists and fertilizer industry people. The deliberations had culminated in specific recommendations for improving food and nutritional security through science-based K management in agriculture, as well as to ensure mitigation of adverse effects of climate change.

Recommendations:

A. Needed Policy Interventions for efficient K management

- There is an urgent need to maintain price discipline for potash fertilizer through Government intervention in order to ensure affordability and accessibility of K fertilizer to farmers to improve their crop productivity, double the income, and sustain soil health. Frequent price fluctuations significantly impact potash consumption, negating all extension efforts to increase awareness.

- Bring Urea under the Nutrient Based Subsidy (NBS) policy so as to promote balanced use of P and K fertilizers, improve N use efficiency, and to reduce loss of N to the environment through greenhouse gas emission.

- Ensure last mile delivery of K fertilizers to the farmers, and effectively engage the existing two lakh strong fertilizer dealer/retailer network with the public extension system to create awareness among farmers on economic and long term social benefits of applying K fertilizer.

- Formulate policies to promote the use of K based on existing soil maps and the national soil health card database by delineating K deficient areas of the country. Also ensure timely supply of K fertilizer in those areas, and promote K use through concerted extension efforts with fertilizer industry.

- Bring Sulphate of Potash (SOP), an important source of K, under the NBS policy to ensure manufacturing the water-soluble fertilizers, besides other direct benefits to the farmers.

B. Efficient extension system to improve on-farm K management.

- There is a definite need to revise K recommendations for crops and cropping systems, based on spatially explicit crop responses and information based on the soil health card database, and disseminate the same effectively both to public and private extension systems in each state.

- Develop and use soil fertility maps for K based on the soil health card database for increasing awareness at the grass-root level, and for policy planning towards allocation of K fertilizer.

- Integrate the Nutrient Expert fertilizer decision support tool with the national soil health card database to provide site-specific/farmer-specific balanced K fertilizer recommendations.

- Promote split application of potash using the seed-cum-fertilizer drill to increase K use efficiency. This should be ensured through policy intervention to provide subsidy on seed-cum-fertilizer drill.

- Develop an effective engagement between the fertilizer industry and researchers to strengthen K fertilizer development and use research, and for rational use by the farmers.

- Educate farmers, dealers and the retailers of fertilizer industry with consistent message on the specifics of K use through public and private extension efforts and researchers' interventions, so as to avoid confusion arising through multiple source messages.

C. New dimensions of potassium research

- There is an urgent need to initiate a review of K research conducted so far in India. It is also important to develop a network on K research at national level to see what we have not yet addressed, and what new research is needed both in the current and future context. Some specific research needs defined are:

  a. Update the current fertility ratings of "low", "medium," and "high" of available K to accommodate the needs of intensive cropping systems as well as spatially and socially variable yield targets. Develop a rapid method of measuring non-exchangeable K and integrate that information in the K recommendation process.

b. Initiate systematic research on the right source, rate, time and method combination of K application in major crops and cropping systems in India for different agro-climatic zones.

c. Revise K recommendations for modern cultivars especially of plantation and horticultural crops for improving both productivity and crop quality.

d. Develop scientific understanding on K dynamics in conservation agriculture (CA) systems for quantifying K inputs, particularly for cereal based cropping systems.

e. Explore the potential of alternate potash sources, such as low-grade potash-bearing minerals, e.g. glauconite deposits, polyhalite deposits, mica wastes coupled with potash-solubilizing bacteria, crop residues etc. for partial substitution of potassic fertilizer.

- Study the physiological role of K in enabling crops to cope with heat, low temperature, drought, and pest and disease stresses, and at elevated ambient CO_2, which are evident effects of climate change, through joint efforts of soil scientists, agronomists, plant physiologists and molecular biologists to develop K recommendations for managing biotic and abiotic stresses.
- Initiate multidisciplinary research involving agronomists, geneticists, soil scientists, biotechnologists, economic botanists, and others in a consortium mode to understand Genotype X Environment X Management interactions under various K regimes.
- Understand the role of K in addressing non-communicable diseases, such as cardio-vascular diseases, diabetes and osteoporosis, affecting Indian population, through collaboration with medical institutions/researchers.
- Research on precision K management using modern tools and techniques is needed. Use of modern machine learning techniques and big data analysis to characterize landscapes based on K stocks, expected K use efficiency, and the yield goals for predicting K responses under specific soil-management-environment combinations, is the need of the hour.

For additional information, please visit:

I) Concept Note and Program: http://ipni.info/kindia2017
ii) Book of extended summaries: https://conference.ipni.net/conference/kindia/kindia2017.nsf/info/article/KINDIA2017-7 and
iii) Presentations made at the conference: https://conference.ipni.net/conference/kindia2017/about/sessions

Copies available at:

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