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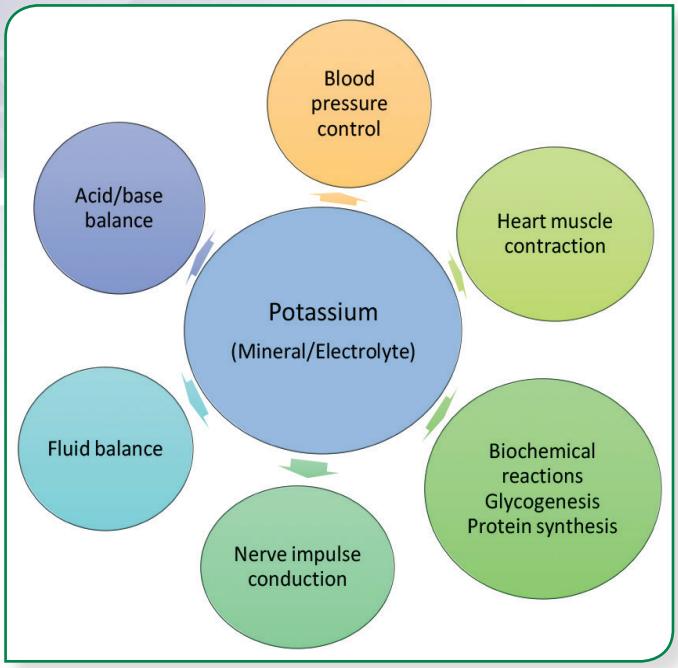
# HUMAN HEALTH IS CONNECTED TO SOIL POTASSIUM FERTILITY

Potassium (K) plays an important and well-recognized role in human nutrition. It has physiological significance for many functions of the human body. For example, the condition called hypokalaemia refers to K deficiency due to excessive K loss caused by kidney failure, diarrhea, or insulin over production, and may result in muscle weakness, mental confusion, irregular heartbeat, and even sudden death.




*Roles of potassium in the human body (Kotnis et al., 2017).*

Similarly, plants also need K as an essential nutrient for completing their metabolic functions. Plants with adequate K produce more harvestable products that are rich in K. While plants depend on the soil for fulfilling their K requirement, humans in turn depend on plants for meeting their K requirement, making the soil a critical component for human wellness. It is important that K nutrition be looked at from the perspective of a complete soil-plant-human health continuum. The following evidence from India highlights this importance.

A recent estimate based on recommended dietary K intakes and the distribution of India's population indicates an annual human K requirement of 1.96 million (M) t (**Table 1**). Annual agricultural production statistics report that about 486 M t of agricultural food sources were recently available, which ensured an estimated supply of 1.24 M t K (**Table 2**). Although these calculations do not include K supplied from animal food sources, which are also dependent on K from the plant biomass, the difference reveals a wide gap of 0.72 M t between the K supplied from plant-based foods and the recommended dietary intake for humans.

The gap between dietary requirement and availability of K could either be achieved through greater intake of K originating from available sources of animal-based food products, or by increasing the overall quantity of food crops that are available for consumption by the Indian population. The other way of increasing dietary K supply is by sustainably intensifying food crop production through balanced and adequate K application, which can improve the K concentration of the harvested portion of fruits, vegetables, and other plant-based products.

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*"Potassium (K) application to crops in India is insufficient to fulfill the dietary requirement of the population, which is often overlooked in a quantity-centric crop production approach."*

Crop production statistics also estimate total removal of K by these major crops at 8.9 M t (**Table 2**). The K removed from soil by crops needs to be returned back to the soil through fertilizer or other sources such as crop residue, manure, etc. Otherwise plants meet their additional K requirement by mining native soil reserves, thus depleting the long-term K fertility of soil. An inadequate supply of K also disrupts many physiological and biochemical processes within the plant, hampering crop growth, productivity, and nutritional quality due to inadequate uptake and under-utilization of other essential nutrients.

Potassium application to crops in India is insufficient to fulfill the dietary requirement of the population, which is often overlooked in a quantity-centric crop production approach. Adequate K supply to humans is best ensured through plant food sources rich in K. Inadequate K application in crops not only promotes soil K mining, adversely affecting soil health, but also impacts the quality of life of the Indian population due to their nutritional inadequacy.

## Further Reading

Kotnis, A. et al. 2017. Indian J. Fert. 13(11):16-23.

*Table 1. Distribution of population by age groups and human K requirement in India.*

| Age group, yrs | *Population, million | **Recommended K intake, g/day | K requirement of Indian population, M t/yr |
|---|---|---|---|
| Below 1 | 20 | 0.55 | 0.004 |
| 1-3 | 61 | 3.5 | 0.088 |
| 4-8 | 121 | 3.8 | 0.176 |
| 9-13 | 130 | 4.5 | 0.215 |
| 14-18 | 120 | 4.5 | 0.205 |
| 19-30 | 260 | 4.7 | 0.453 |
| 31-50 | 291 | 4.7 | 0.514 |
| Above 50 | 170 | 4.7 | 0.300 |
| Total | 1,210 | - | 1.956 |

*www.censusindia.gov.in
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*Table 2. Totals for the production of major food crop sources, the K available for human consumption of these food sources, and the amount of K removed in harvested crop product in India.*

| Food crop source | Production, M t | K available for consumption, M t | Crop K removal, M t |
|---|---|---|---|
| Cereals | 243 | 0.47 | 5.93 |
| Pulses | 16 | 0.14 | 0.63 |
| Oilseeds | 7.5 | 0.19 | 0.76 |
| Fruits | 79 | 0.15 | 0.71 |
| Vegetables | 139 | 0.29 | 0.87 |
| Total | 486 | 1.24 | 8.91 |

Source: Kotnis et al., 2017

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