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Title:	SOLUBILIZATION OF POTASSIUM FROM WASTE MICA AS AFFECTED BY POTASSIUM SOLUBILIZING MICROORGANISMS AND ORGANIC ACIDS AND ITS AVAILABILITY TO MUSTARD (Brassica juncea) IN ALFISOL AND INCEPTISOL
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Abstract:	The role of potassium as fertilizer is indispensible for enhancing agricultural productivity. India ranks 4 th in the world as far as total consumption of K-fertilizer is concerned but the entire quantities of K-fertilizers are imported from other countries to meet the demand. The realization of enormous cost involved in their import has necessitated the search for alternative strategies for sustainable crop production, particularly in K-deficient soils. Therefore, an attempt was made to study the solubilization of potassium from waste mica (K-bearing mineral) as affected by potassium solubilizing microorganisms and organic acids and to evaluate its efficacy in increasing yield and uptake by mustard (Brassica juncea). An incubation study and a pot culture experiment were conducted in two contrasting soils collected from Ranchi, Jharkhand (Alfisol) and IARI, New Delhi (Inceptisol). The release pattern of different pools of K as affected by addition of waste mica along with two organic acids namely, citric acid and oxalic acid and potassium solubilizing bacteria (KSB) namely, Bacillus sp. (KSB1) and Pseudomonas sp. (KSB2) were monitored over a period of 90 days of incubation. Results emanated from incubation experiment showed an improvement in water soluble K, exchangeable K and non-exchangeable K from 45 to 90 days of incubation. Positive impact of organic acids was observed in solubilization of K and the effect of oxalic acid was found to be better than citric acid. Between the two bacterial cultures, Bacillus sp. showed higher K release than Pseudomonas sp. Pot culture experiment conducted for assessing the performance of waste mica treated with organic acids and bacterial cultures showed significant improvement in all the parameters over absolute control. The yield obtained in pots with treated mica was 70.4 and 42 per cent higher over absolute control and 27.8 and 20.5 per cent over the treatments without waste mica, in Alfisol and Inceptisol, respectively. Treatments with oxalic acid was found to be more pronounced than citric acid in terms of enhancing seed, stover and biomass yield and K uptake by mustard. Similarly, significant improvement in yield attributes and K uptake by mustard was observed with KSB inoculation as compared to uninoculated ones. In general, the impact of muriate of potash (MOP, used as standard K-fertilizer) was found to be better than the mean of all the treatments in terms of yield parameters. However, the impact of mica treated with oxalic acid and Bacillus sp. individually or in combination was found to be comparable to MOP regarding biomass yield in both the soils. Between the two soils, the seed, stover, biomass yield and K uptake by crop were found to be much higher in Inceptisol than Alfisol. Soil samples collected at different growth stages of crop showed that significant improvement in water soluble and exchangeable K fractions were observed at stem elongation and flowering stages followed by a little variation at maturity 108 stage. The effects of organic acids and microbial cultures were almost similar in terms of different pools of K in soils as well as yield, K content and K uptake by crops in both the soils. Relative agronomic efficiency on yield of mustard and per cent K recovery from waste mica was found to be higher in Alfisol than Inceptisol. It can be concluded that use of waste mica along with organic acid and microbial culture is beneficial in terms of maintaining K supply in soil for crop production. Therefore, it may be used as an alternative source of K, though it cannot completely replace Kfertilizer yet it can definitely be used to reduce the use of costly K-fertilizer like MOP.
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