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Breeding for Nitrogen Use Efficiency in Vegetable Crops

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INTRODUCTION

The global population is estimated to reach 8.7 –10 billion by the end of 2050. With the growth of the global population, an increase in global food production is needed in an economical and environmentally-friendly way. The doubling of agricultural food production has been associated with a seven fold increase in the use of nitrogen (N) fertilizers. As a consequence, both the recent and future intensification of the use of N fertilizers in agriculture already has and will continue to have major detrimental impacts on the diversity and functioning of the non-agricultural neighbouring bacterial, animal, and plant ecosystems. It is necessary to select and release new crop varieties requiring less nitrogen fertilizer, but maintaining high yield and good grain quality.

Sharifi et al. (2007) conducted experiment on Screening for Nitrogen-Use Efficiency in five potato cultivars result revealed that Chieftain had high N-uptake efficiency and high N-utilization efficiency whereas Russet Norkotah had low N-uptake efficiency and also observed Root dry weight in combination with plant N accumulation was considered as a good indicator of N uptake efficiency in low solution $NO3^-$ concentration.

Colla et al. (2010) observed that higher nitrate reductase activity of grafted plants under low nitrate conditions confirms that certain rootstocks have the potential to improve the NUE of grafted plants and also noted that increasing the N fertilization rates from 0 to 120 kg_ha^{-1} increased the total and marketable yields of melon plants, whereas the NUE decreased when averaged over N levels, the marketable yield, NUE, and N uptake efficiency were higher by 9%, 11.8% and 16.3% respectively in 'Proteo' grafted onto 'P360' than in ungrafted 'Proteo' plants.

Singh and chaturvedi (2012) worked on effects of salicylic acid on seedling growth and nitrogen use efficiency in Cucumber The present results show that optimal physiological concentrations of SA(50 mM) are required to increase NUE and also The germination percentage, root length, shoot length, and dry mass of cucumbers increased significantly in response to 50 mM salicylic acid.

Kale and Gawade (2016) observed that The growth attributes of brinjal viz. yield and biomass have shown increase of 91% and 45.73% respectively in the treatment where 1/4th RDF along with ZnO Nanoparticles (ZnO NP) is used over the treatment with RDF alone. It also implies that the nutrient use efficiency of complex fertilizer can be increased by ZnONP.

Navarrete et al. (2015) conducted a research on mapping population consisting of 335 individuals from a cross of Ranchero and Marabu of spinach were mapping analysis detected 39 trait specific QTLs, with several QTLs accumulating on P01 and P02 of the linkage map. The QTLs and in particular the P01 and P02 regions provide potential targets for the improvement of NUE in spinach.

CONCLUSION

Nitrogen is one of the most important nutrients for plant growth and is a limiting factor for crop production and also cost of mineral nitrogen fertilizer accounts for a major portion of the total cost of production. Therefore need to develop cultivars that can exploit N more efficiently in order to minimize loss of N, reduce environmental pollution, decrease input cost and make more economic use of the absorbed nitrogen.

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