Effect of Soil and Cultivar on Incidence of Zn Deficiency in Important Mango Cultivars of India

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INTRODUCTION

Mango is the predominant fruit crop of India occupying 2.4mha, grown in humid tropic, semi-arid and subtropical climates on a wide variety of soils, including acid alfisols in Konkan, vertisols in Andhra Pradesh and entisols in Uttar Pradesh. However, the mango productivity on these soils is with 5 – 6 t ha^{-1} $year^{-1}$ low. Zinc deficiency is one of the important reasons for a lower productivity, and it contributed to delayed flowering and small-sized fruits (Satish Kumar et al. 1992). Cultivars differ in their susceptibility to Zn deficiency. Cultivars that are prone to irregular bearing, such as Alphonso, were more susceptible to Zn deficiency than regular bearers, such as Neelum. Thus, this study was initiated to examine soil, leaf and Zn status of different cultivars and their relation to mango yield and Zn mobility in the plant to modify and correct management practices.

METHODS

A survey was conducted in young and old mango orchards on alfisols in the tropical humid region of Konkan, namely in the Krishna, Kolar and Krishnagiri district, and in Tamil Nadu with trees 10-12 and 30-40 years of age. Soils were sampled in the root zone layer (0 – 30 cm). Leaves from non-bearing shoots (4 – 6 months old) were sampled to monitor leaf health and Zn nutrition of healthy and deficient trees. Young and old leaves were fractionated into petioles and laminas and analyzed for K, Mg and Zn to compare the mobility of Zn in relation to the mobile nutrients K and Mg.

RESULTS AND DISCUSSION

The results are presented in Table 1. They indicate that more leaf-Zn is needed for leaf health in irregular bearing varieties (43 mg kg^{-1} leaf-Zn), whereas the regular varieties are able to growth healthily with 25 mg kg^{-1} leaf-Zn even through the available Zn in the soil (0.42 mg kg^{-1}) was low.

Zinc has been classified as partially mobile in plants. The study was undertaken to compare Zn mobility to mobile elements, such as K and Mg, by comparing Zn contents of petioles and laminas. Results indicate that Zn is as mobile under deficient conditions as K (Table 2).

Despite deficient leaf-Zn levels in the examined orchards, Zn concentrations were higher in petioles than in laminas similar to K and Mg. Manganese exhibited its immobile nature. Manganese concentrations were higher in laminas than in petioles. This indicates that a continuous supply of Mn is a more important problem than the Zn-deficiency since mango plants can avoid extreme Zn deficiency by mobilizing Zn from old leaves. The mobility of Zn in young and old leaves, especially under deficiency conditions, was noted with significance.

Table 1. Soil and leaf Zn status.

Cultivars	Soil type	Available Zn DTPA	Health deficiency Leaf Zn	Leaf
		←	mg kg^{-1}	→
1. Alphonso-Konkan Age 30-40 yrs, irregular	Acid alfisol (pH 4.5-5.5)	0.65	34.8	18
2. Banganpalli-Nuznid AP, Age 30-40 yrs, irregular	Neutral alfisol (pH 6.2-6.8)	0.45	45.2	14
3. Banganpalli Age 10-15 yrs	Neutral alfisol (pH 5.8-6.5)	0.42	48.0	17
4. Alphonso Age 10-15 yrs, regular	Neutral alfisol (pH 5.8-6.2)	0.48	43.0	18
5. Neelum Age 30-40 yrs, regular	Neutral alfisol (pH 6.2-6.8)	0.45	26.2	12
6. Totapuri Age 30-40 yrs, regular	Neutral alfisol (pH 6.2-6.8)	0.35	28.2	14
7. Mallika Age 10-12 yrs, regular	Neutral alfisol (pH 6.2-6.8)	0.45	22.2	12
8. Amrapali Age 10-12 yrs	Neutral alfisol (pH 6.2-6.8)	0.38	23.0	12

Table 2. Zinc, K and Mg content of petioles and laminas of different mango cultivars at different locations.

Cultivar	Petiole				Lamina			
	Zn	K%	Mg%	Mn	Zn	K%	Mg%	Mn
Neelum	22	0.97	0.10	19	13	0.66	0.10	41
Sendura	19	1.07	0.11	26	14	0.71	0.12	38
Totapuri	22	1.0	0.16	24	14	0.48	0.18	75
Alphonso	27	0.84	0.25	33	11	0.46	0.24	68
Neelum old leaf	17	0.17	0.16	44	11	0.12	0.12	72
Banganpalli	13	0.73	0.11	28	12	0.52	0.09	52

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