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EFFECT OF CRITICAL MICRONUTRIENTS FOLIAR APPLICATION ON YIELD OF CASHEW (*ANACARDIUM OCCIDENTALE* L.) UNDER AGENCY TRACTS OF RAMPACHODAVARAM (ANDHRA PRADESH), INDIA

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Abstract

The results revealed that Foliar application of Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) recorded highest number of flowering laterals (20) per square metre, perfect flowers (235.70) per panicle, male flowers (520.7) per panicle, nut weight (11.97 g), and nut yield (11.67 kg) per tree. From the study, it was found that the foliar application of Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) is beneficial for increasing the nut yield through improvement in sex ratio (0.31), fruit set and net return Rs 82667 ha^{-1} cashew *var*. BPP-8.

Key words : Foliar application, micronutrients, cashew, nut yield.

Introduction

Foliar nutrition is considered to be the ideal method of application of nutrients for rain fed cashew farming as the said method of farming in cashew is associated with the low fruit set, poor fruit quality along with excessive fruit drop. It would be interesting to know if the foliar application of micronutrients can increase the nut yield in cashew which is mostly supplied with major nutrients. Further, it would help in planning an optimum fertilizer recommendation to cashew for high nut quality and sustained yields. Indeed, very little is known about the effects of foliar nutrition with micronutrients in cashew. In this context, it would be worthwhile to study the influence of micronutrients in cashew. It would be interesting to know if a higher number of fruit produced through artificial measures such as certain micronutrients also causes increase in total harvested nut weight.

Materials and Methods

The study was carried out on 12 years old plantation (variety BPP-8) in different villages of 10 farmers during the period of 2012-15. The treatment was utilized for spraying commercial formulation 4 which comprising of Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%), which was manufactured & marketed by T. Stanes & Company Ltd. The micronutrients were sprayed during flushing, flowering and fruiting stage using foot pump paddle sprayer covering the entire canopy. Observations on number of flowering laterals per square metre, number of non- flowering laterals per square metre, total number of laterals per square metre, number of male flowers per panicle, number of hermaphrodite flowers per panicle, total number of flowers, number of fruits set per panicle, number of fruits drop per panicle, number of fruits retained per panicle, nut yield (kilogram) per tree and nut weight (gram) was recorded in all the treatments. The data was analyzed by using simple analysis by taking mean.

Results and Discussion

The trees sprayed with Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) produced highest number of flowering laterals (20) per square metre and least number of non-flowering laterals (5) per square metre. The least number of flowering laterals and highest number of non flowering laterals were recorded with unsprayed (control) trees.

Application of Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) had positive effect in increasing number of hermaphrodite flowers (235.7) and

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Table 1 : Effect of foliar application of micro nutrients spray on different reproductive parameters.

Years	Flowering laterals		Non flowering laterals		Hermaphrodite flowers		Male flowers		Sex ratio		Nut weight (g)		Nut yield (kg/tree)	
	Demo	Check	Demo	Check	Demo	Check	Demo	Check	Demo	Check	Demo	Check	Demo	Check
2012-13	19	8.80	5	14	230.0	70.0	520.0	320.0	0.30	0.17	11.5	5.60	11.2	5.5
2013-14	20	9.50	4	16	254.0	72.0	512.0	315.0	0.33	0.18	12.6	5.90	12.0	5.9
2014-15	21	10.0	6	15	223.0	75.0	530.0	360.0	0.29	0.17	11.8	5.40	11.8	5.4
Mean	20	9.40	5	15	235.7	72.3	520.7	331.7	0.31	0.18	11.97	5.63	11.6	5.6

Table 2 : Effect of micronutrients on yield attributes.

S. no.	Years	Gross return (Rs/Ha)		Net returns (Rs/Ha)		Cost of cultivation (Rs/ha)		Yield (Q/ha)		B C Ratio	
		Demo	Check	Demo	Check	Demo	Check	Demo	Check	Demo	Check
1	2012-13	98,000	58,000	78,000	38,000	20,000	20,000	9.8	5.8	4.9:1	2.9:1
2	2013-14	95,000	63,000	75,000	43,000	20,000	20,000	9.5	6.3	4.75:1	3.15:1
3	2014-15	1,15,000	66,000	95,000	46,000	20,000	20,000	11.5	6.6	5.75:1	3.3:1
Mean		1,02,667	62,333	82,667	42,333	20,000	20,000	10	6	4:1	3:1

male flowers (520.7). The least number of hermaphrodite flowers (72.3) and male flowers (331.7) were recorded with control. Improvement in sex ratio (0.31) with application of micronutrients was mainly due to increased number of bisexual flowers. It is clearly evident from the above results that Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) had stimulating effect and caused the physiological changes in the tissues influencing the flowering characters.

Micronutrient influences flowering and fruit set through its role in auxin biosynthesis as auxins play a major role in flowering and fruit set. It is better to give a foliar spray at pre-bloom for pome fruits and a pre- bloom and post-bloom spray for other fruits. Since B is phloem mobile, in some fruits like apple, one spray at flowering is sufficient, whereas, for B immobile crops like mango, prebloom and post- bloom sprays are essential (Edward Raja and Anilkumar, 2005). Because boron is not readily translocated within the tree, it is most critically used as foliar applications targeted at key periods of flower and fruit formation so as to maintain flower set and fruit quality. Foliar applications of boron generally are more effective in supplying sufficient boron for flowering and reproductive development in crops (www.borax.com/agriculture).

Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) showed highest fruit set (11.20) least fruit set in control (5.10). Micronutrients in fruit set through its influence on auxin biosynthesis. Boron is integral to a plant's reproductive cycle, controlling flowering, pollen production, germination, and seed and fruit development. The mineral also acts as a fuel pump, aiding the transmission of sugars from older leaves to new growth areas and root systems. Foliar spray of micronutrients was effective in increasing the number of fruits per plant in guava (Sharma, *et al*., 1991). Highest nut weight (11.97 g) was associated with the spray of Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) which was significantly superior over control (5.63). Highest nut yield (11.60 kg/tree) was found with the spray of Fe (4.0%) + Mn (3%) + Cu (1%) + Zn (6%) + Mo (0.05%) + B (2%) which was significantly superior over other treatments. Unsprayed trees (control) were associated with least nut yield (5.6 kg/tree). Sexual reproduction is more sensitive to low B than vegetative growth, and a marked reduction in fruit- set can occur without expression of B deficiency symptoms in vegetative parts. Maintaining high B levels in reproductive parts is a vital component of efficient B management for yield in horticultural crops. (Raja, 2009). The improvement in yield due to micro elements may be ascribed to better photosynthesis, less fruit drop, improved fruit size and fruit weight (Singh, 2012). Swietlik (1999) reported that micronutrient foliar sprays applied before anthesis may be most beneficial in terms of fruit yield in citrus.The demo plot was recorded the higher gross return of Rs. 102667 ha^{-1} and net return of Rs. 82667 ha^{-1} over local check (table 2). Higher B: C ratio (4:1) was found in demo.

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