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Effect of Paclobutrazol on Flowering, Fruiting and Yield of Cashew (*Anacardium occidentale* L.) in West Coast Region of Karnataka

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A B S T R A C T

An investigation was carried out for three consecutive years 2011-13 years to study the influence of Paclobutrazol (PBZ) on flowering, fruiting and yield of cashew cultivar ullal-3. The various doses of paclobutrazol *i.e.* 1.0, 2.0 and 3.0 g a.i., per plant was applied as soil drench annually, biennially and once in three years in the month of October before vegetative flushing of plants. The application of paclobutrazol @ 2.0 g a.i per plant found effective in improving flowering and fruiting parameters of cashew. The sex ratio ranged from 0.17 to 0.27 percent in treated plants while in untreated plants it was 0.15 to 0.21 percent. The number of flower panicles per plant ranged from 53.5 to 68.4 in treated plants while in untreated plants it was 53.5 to 62.7. The length and width of flower panicles ranged from 11.6 to 17.3 cm and 16.5 to 23.3 cm respectively, in treated plants while, in untreated plants, 17.1 to 18.1 cm and 22.8 to 23.6 cm respectively. The PBZ treated plants recorded nut length of 3.0 to 3.3 mm, nut width of 2.4-2.5 mm, nut weight of 6.63 to 7.56 g and nut volume of 6.84-7.74 cc while in untreated plants nut length of 3.0 to 3.2 mm, nut width of 2.4-2.5 mm, nut weight of 7.02 to 7.36 g and nut volume of 7.25-7.64 cc respectively. The average yield of treated plants ranged from 0.76 kg to 1.13 g/plant while, in untreated plants nut yield of 0.67 to 0.73kg per plant.

Introduction

Cashew (*Anacardium occidentale* L.), has unique importance in human life as delicious snack food for resources conservation and utilization of degraded lands, generation of employment opportunities and earning of foreign exchange. Cashew kernel is a rich source of protein, carbohydrate, fat and minerals. Apart from cashew kernel, cashew nut shell liquid expelled during processing is a valuable industrial raw material which finds use in a number of industries such as friction lining, paints, varnishes etc. Other valuable products from cashew industry are cashew testa and tannin. Cashew apple is very rich in ascorbic acid (240 mg/100g), and also a fairly good source of vitamin A, antioxidants and minerals. Feni is a popular beverage from cashew apple but several other products like juice, pickle, candy etc. can be prepared (Anonymous; 2013).

India is the first country which

commercialized cashew as a horticulture crop. Research and development efforts on cashew have resulted in achieving 5.6 times increase in production and 3.1 times increase in area from 1971-72. During 2012-13, total production of cashew in the country was 7.28 lakh tonnes from 9.82 lakh ha of land with productivity of 772 kg/ha. Globally, Indian share in the cashew area and production is 20 per cent and 16 per cent respectively (Anonymous, 2013).

Cashew being a fast growing woody perennial covers the allotted space under high density planting, within a short span of 6-7 years. High density planting is the order of the day in most of the horticultural crops to enhance the productivity per unit area due to shrinking cultivable land area in the country. Controlling excessive vegetative growth for increased or sustained productivity is the major principle of high density planting (Santram, 1996). In cashew, due to non-availability of dwarf clones, dwarfing root stocks or a pruning technology for the management of vigorous canopies, use of growth retarding chemicals assumes significance. Treatments with growth retardants like Paclobutrazol was found effective in reducing the growth of fruit crops like pear, peach, lemon, apple, litchi, apricot, plum and mango (Chadha, 1996). The reduction in growth was observed in cashew when Paclobutrazol was applied to young grafted plants at nursery stage (Misra and Singh, 1991). However, the information with respect to effect of Paclobutrazol on growth and yield of grownup cashew tree is lacking. Hence, an investigation was taken up to study the effect of Paclobutrazol on flowering, fruiting and yield of cashew.

Materials and Methods

The experiment was conducted during 2010-2012 at Experimental Station, Shantigodu (Directorate of Cashew Research), Karnataka, India. The experimental site is situated at 12.25 º N- latitude, 75.4 º E- longitude and 90 m above mean sea level. The experimental soil was lateritic and having slightly acidic pH of 5.5 with low soluble salt (EC dSm^{-1}), organic carbon 0.14-1.68, and base saturation of 26-31 per cent. The mean annual temperature is 27.6 ^{o}C and mean maximum and minimum temperature are 36^{o} C and 20^{o} C respectively. The study area lies along the West Coast region of India where the climate is seasonally wet and hot humid, with distinct dry seasons (from January to May) during which the cashew development takes place. The average annual rainfall of the study area is 3500 mm and is distributed from late May to November. The trade name of the chemical used in the study was Cultar (23% flowable concentration of Paclobutrazol). The three year old trees of variety Ullal-3 spaced at 3m x 3m were selected for the study. The experimental design was split plot with five replications. Paclobutrazol was applied before vegetative flushing in the month of October. The main plot represented doses of paclobutrazol viz., 0.0 (Control) 1.0, 2.0 and 3.0 g. a. i. per plant as soil drench. The sub plots consisted of duration of PBZ application, *viz*., annual, biennial and triennial. The plant canopies were made uniform with required height and spread by pruning during the month of May after harvesting of the crop. The PBZ at required concentration was dissolved in the water and applied in 10-15 cm deep trench at 60 cm away from the plant trunk and covered with soil. The observations of flowering parameters such as number of male and female flowers, sex ratio, flower duration, number of flower panicles, number of rachis, length and width of flower panicles and nut yield observations such nut weight, length, width, thickness, volume and yield were recorded according to treatment. The analysis was done as per standard procedure (AOAC, 1994). The data on various parameters were analyzed subjected to statistical analysis using SAS

statistical software.

Results and Discussion

The results of various treatments for different characters are presented in relevant part of results and discussion.

Flowering parameters

Male and female flowers

The flowering parameters of cashew like number of male and hermaphrodite flowers were recorded after imposition of paclobutrazol. The paclobutrazol application reduced the production of number of male and hermaphrodite flowers up to maximum extent (20.69 % and 16.39 %) by PBZ application at 3.0 g.a.i. followed by 2.0 g.a.i. per plants. The effect of paclobutrazol was found non-significant for production of male and hermaphrodite flowers with frequency and doses of PBZ application. However, the annual application of paclobutrazol was significant on male flowers production as compared to control where PBZ was not applied. It may be due to development of complete (hermaphrodite) flowers needs more reserves from the tree than unisexual flowers because of the additional structures required. Singh (1987) estimated that less than 0.1% of the hermaphrodite flowers develop into mature fruit; the rest fall to the ground. Assuming there are 100 000 flowers and each flower contains 10 μg N, then each time a tree flowers it loses 1 kg N. The tree will, therefore, need to have adequate reserves for flower and subsequent fruit formation. Consequently, in the current observation, the percentage of hermaphrodite flowers was higher for soil-drenched trees with PBZ at a concentration of 2.0, as well as 3.0 g a.i. per tree which had higher reserves. Because of excessive vegetative growth and low reserves, the inflorescences from untreated trees had the lowest percentages of hermaphrodite flowers. A higher percentage of hermaphrodites than male flowers following PBZ treatment were also observed in 'Alphonso' mango (Vijayalakshmi and Srinivasan, 2002) (Fig. 1).

Sex ratio

A perusal of the data present in table 1 revealed that the sex ratio was recorded after application of paclobutrazol as soil drench. The imposition of paclobutrazol was increased the sex ratio up to (41.08 %) by PBZ application @ 3.0 g.a.i followed to 2.0 g.a.i. annually and biennially per plant. The frequency and time of paclobutrazol application was also found significant but interaction between rate and frequency of PBZ application was found non-significant. It may be due to the development of complete (hermaphrodite) flowers requires more reserves from the tree than unisexual flowers because of the additional structures required and excessive vegetative growth and low reserves, the inflorescences from untreated trees had the lowest percentages of hermaphrodite flowers in compared to treated plants. This result was similar to that of Hoda *et al.,* (2001) in mango. A higher percentage of hermaphrodite flowers than male flowers following PBZ treatment were also observed for 'Alphonso' mango (Vijayalakshmi and Srinivasan, 2002).

Flowering duration

Flowering duration was got reduced up to 16.6 per cent with application of paclobutrazol @ 3 g.a.i. followed by 2 g.a.i per plants annually. The minimum flowering duration was observed under the treatment annual application of 3 g.a.i per plant while, maximum duration was seen under triennial application of PBZ @ 1.0 g.a.i per plant. The frequency of annually PBZ application was found significant but doses as well as

interaction effect between frequency and doses was also found non- significant with respect to duration of flowering. Application of PBZ caused an early reduction of endogenous gibberellins levels within the shoots as also observed by Anon. (1984), causing them to reach maturity earlier than those of untreated trees. Flowering in mango is associated with reduced vegetative growth, often induced by lower activity of gibberellins (Voon *et al.,* 1991).

Flowering panicles per plants

The observation on flower panicles per plant was recorded after imposing the treatment of paclobutrazol in Ullal-3 cultivar. The effect of paclobutrazol was found significant in increasing the number of flower panicles per plant with annual application of PBZ. The maximum number of flower panicles (63.0) were recorded with annual application of PBZ @ 3 g.a.i. followed by 2.0 g.a.i per plant, while the minimum (52.2) was recorded in the control.

The frequency of PBZ application as well as interaction effect between the doses and frequency was found non- significant. It might be due to the increased percentages of flowered branches in PBZ-treated plants on account of lower expenditure of tree reserves towards vegetative growth parameters leading to no assimilate limitations. According to Kurian and Iyer (1992), PBZ can considerably enhance the total phenolic content of terminal buds and alter the phloem to xylem ratio of the stem. Such alterations could be important in restricting vegetative growth and enhancing flowering by altering assimilates partitioning and patterns of nutrient supply for new growth. The results of an experiment by Burondkar and Gunjate (1993) also indicated that PBZ application increased the number of flowering panicles (Fig. 2).

Number of rachis per plant

The effect of paclobutrazol in cashew was found non- significant with respect to the number of rachis per flower. The maximum number of flower rachis (8.06) was recorded in untreated plants as compared to treated plants. The frequency, duration as well as interaction between duration and frequency of PBZ application were also non- significant.

The reduced number of rachis per flower might be due to increased flowering intensity and compactness of flowers associated with paclobutrazol application. Similar results were also reported in different important mango cultivars from Australia (Winston 1992), Indonesia (Voon *et al.,* 1991), Thailand (Tongumpai *et al.,* 1991), and India (Kulkarni 1988) (Table 2).

Length and width of flower panicles

The effect of paclobutrazol was found significant in reducing the length and width of flower panicles @ 3.0 g. a.i. per plant followed by 2.0 g. a.i. per plants. The maximum length and width of flower panicles was recorded under the control where PBZ was not applied.

All the doses of PBZ application were found significant in reducing the length and width of flower panicles. The frequency of PBZ application also had significant influence in reducing the length and width of flower panicles. The highest reduction (20.3 and 23.5 % respectively) in length and width of flowers panicles was associated with annual application of PBZ. The length and width was lesser when PBZ was applied annually, biennially and triennially (9.0, 8.5 and 2.3 % respectively). The interaction between frequency and doses of paclobutrazol application also influenced the length and width of flower panicles.

Table.1 Effect of paclobutrazol in flowering parameters on cashew cv. Ullal-3

Treatments	Male flower / panicle			Mean	Female flower / panicle			Mean	Sex ratio				Flower duration			Mean
	Y1	Y2	Y3		Y1	Y2	Y3		Y1	Y2	Y3	Mean	Y1	Y2	Y3	
PBZ@1g a.i./pl	311.4	330.2	335.2	**325.6**	57.6	70.2	52.2	**60.0**	0.22	0.21	0.17	**0.20**	61.4	63.4	64.8	**63.2**
PBZ@2g a.i./pl	278.2	285.4	319.4	**294.3**	67.4	62.6	57.4	**62.5**	0.26	0.24	0.18	**0.23**	54.2	57.4	62.8	**58.1**
PBZ@3g a.i./pl	275.8	282.8	318.6	**292.4**	70.0	68.8	55.6	**64.8**	0.27	0.25	0.19	**0.24**	53.6	56.2	62.0	**57.3**
Control	403.2	346.0	357.0	**368.7**	71.0	71.2	59.0	**67.1**	0.15	0.21	0.15	**0.17**	66.6	70.2	69.4	68.7
Mean	**317.2**	**311.1**	**332.6**		**66.5**	**68.2**	**56.1**		**0.22**	**0.23**	**0.17**		**61.4**	**63.4**	**64.8**	**63.2**
Source	L	T	L x T		L	T	L x T		L	T	LxT		L	T	LxT	
SEm±	20.0	17.4	34.7		4.56	3.95	7.90		0.01	0.01	0.02		2.18	1.89	3.78	
LSD (p<0.05)	57.1	NS	NS		NS	NS	NS		0.04	0.03	NS		6.22	NS	NS	

Table.2 Effect of paclobutrazol in flowering parameters on cashew cv. Ullal-3

Treatments	Flower panicles/ Plant			Mean	No. of rachis /flower			Mean	Length of flower panicles (cm)				Width of flower panicles (cm)			Mean
	Y1	Y2	Y3		Y1	Y2	Y3		Y1	Y2	Y3	Mean	Y1	Y2	Y3	
PBZ@1g a.i./pl	63.6	58.1	53.5	**58.4**	7.78	7.84	7.96	**7.86**	16.1	16.2	17.3	16.5	20.7	20.3	23.3	**21.4**
PBZ@2g a.i./pl	66.5	64.1	54.2	**61.6**	7.54	7.72	7.80	**7.69**	12.8	15.0	17.1	15.0	17.8	19.0	20.2	**19.0**
PBZ@3g a.i./pl	68.4	66.5	54.1	**63.0**	7.52	7.70	7.78	**7.67**	11.6	13.6	17.0	14.1	16.5	17.2	20.0	**17.9**
Control	52.2	52.2	52.2	**52.2**	8.06	8.06	8.06	**8.06**	18.1	17.8	17.1	17.7	23.6	23.6	22.8	**23.4**
Mean	**62.7**	**60.2**	**53.5**		**7.73**	**7.83**	**7.90**		**16.1**	**16.2**	**17.3**		**19.7**	**20.0**	**21.6**	
Source	L	T	Lx T		L	T	Lx T		L	T	L x T		L	T	LxT	
SEm±	0.10	0.09	0.18		4.09	3.54	7.08		0.51	0.44	0.88		0.64	0.55	1.11	
LSD (p<0.05)	0.29	NS	NS		NS	NS	NS		1.45	1.26	2.52		1.82	1.58	NS	

Table.3 Effect of paclobutrazol in nut parameters on cashew cv. Ullal-3

Treatments	Nut Length (mm)			Mean	Nut Width (mm)			Mean	Nut Thickness (mm)			Mean
	Y1	Y2	Y3		Y1	Y2	Y3		Y1	Y2	Y3	
PBZ@1g a.i./pl	3.1	3.2	3.3	**3.2**	2.5	2.5	2.5	**2.5**	2.0	2.0	2.0	**2.0**
PBZ@2g a.i./pl	3.0	3.0	3.2	**3.1**	2.4	2.4	2.5	**2.4**	1.9	2.0	2.0	**1.9**
PBZ@3g a.i./pl	3.0	3.0	3.2	**3.1**	2.4	2.5	2.5	**2.5**	1.9	2.0	2.0	**2.0**
Control	3.4	3.4	3.4	**3.4**	2.8	2.8	2.7	**2.8**	2.0	2.1	2.0	**2.0**
Mean	**3.0**	**3.1**	**3.2**		**2.4**	**2.5**	**2.5**		**1.9**	**2.0**	**2.0**	
Source	L	T	L x T		L	T	L x T		L	T	L x T	
SEm±	0.02	0.02	0.04		0.02	0.02	0.04		0.02	0.02	0.04	
LSD (p<0.05)	0.06	0.05	0.10		0.06	NS	NS		NS	NS	NS	

Table.4 Effect of paclobutrazol nut weight, nut volume and yield on cashew cv. Ullal-3

Treatments	Nut Weight (g)			Mean	Nut Volume			Mean	Nut Yield			Mean
	Y1	Y2	Y3		Y1	Y2	Y3		Y1	Y2	Y3	
PBZ@1g a.i./pl	7.02	7.20	7.56	**7.26**	7.20	7.44	7.74	**7.46**	809	806	756	**790**
PBZ@2g a.i./pl	6.78	6.90	7.26	**6.98**	7.04	7.26	7.50	**7.27**	1127	1090	985	**1067**
PBZ@3g a.i./pl	6.63	6.71	7.07	**6.80**	6.84	7.26	7.42	**7.17**	1031	1015	960	**1002**
Control	7.67	7.96	7.56	**7.73**	7.90	8.20	7.88	**7.99**	**668**	**712**	**728**	**703**
Mean	**7.02**	**7.19**	**7.36**		**7.25**	**7.54**	**7.64**		809.8	806	756	**790**
Source	L	T	L x T		L	T	L x T		L	T	L x T	
SEm±	0.07	0.06	0.13		0.07	0.06	0.11		27.1	23.5	47.0	
LSD (p<0.05)	0.21	0.18	0.36		0.19	0.16	NS		77.3	NS	NS	

Fig.1 Effect of paclobutrazol on per cent reduction and increment of male, female sex ratio and of cashew cv. Ullal-3

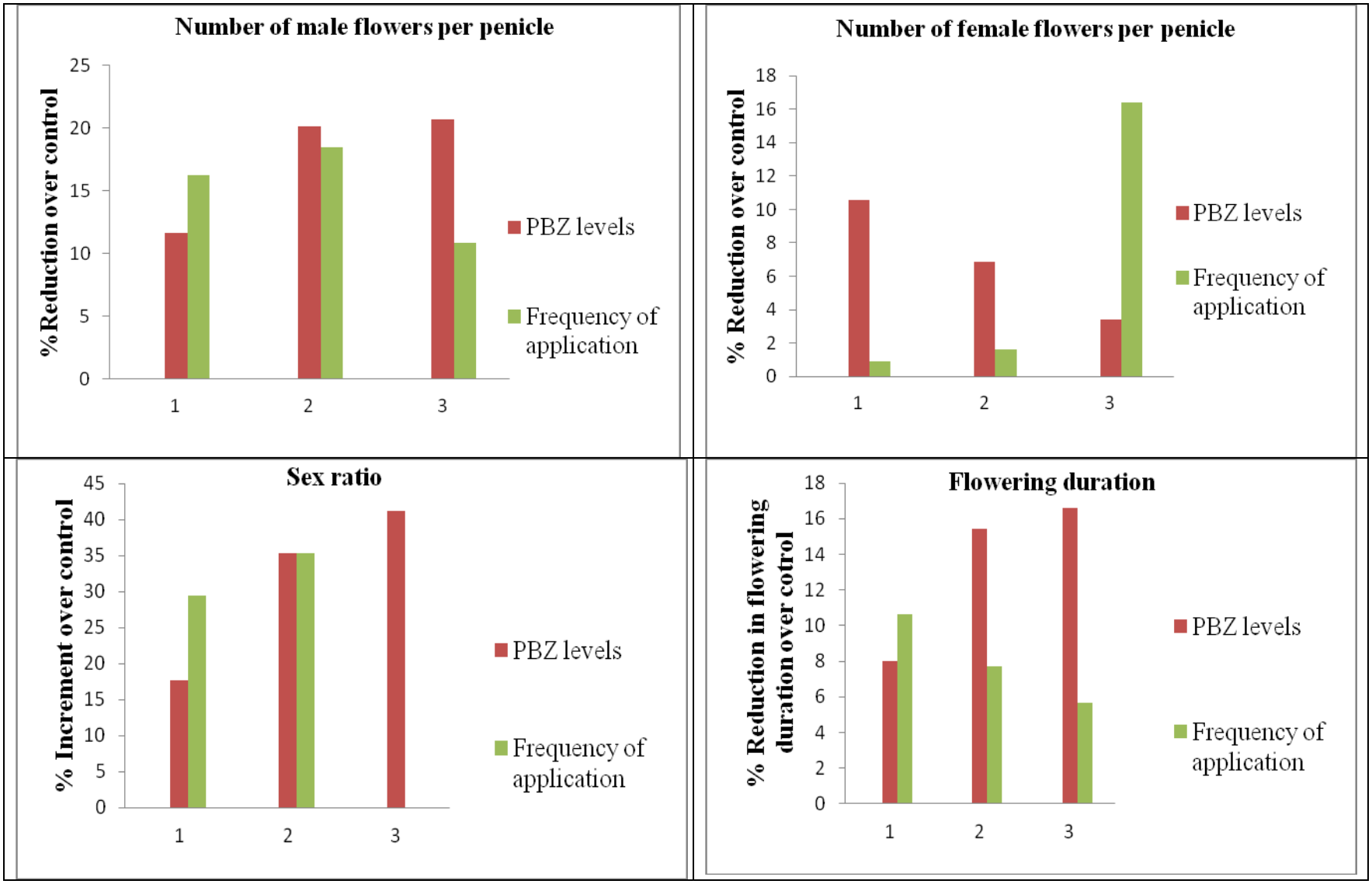


Fig.2 Effect of paclobutrazol on per cent reduction and increment of flower panicles, rachis, rachis and width of cashew cv. Ullal-3

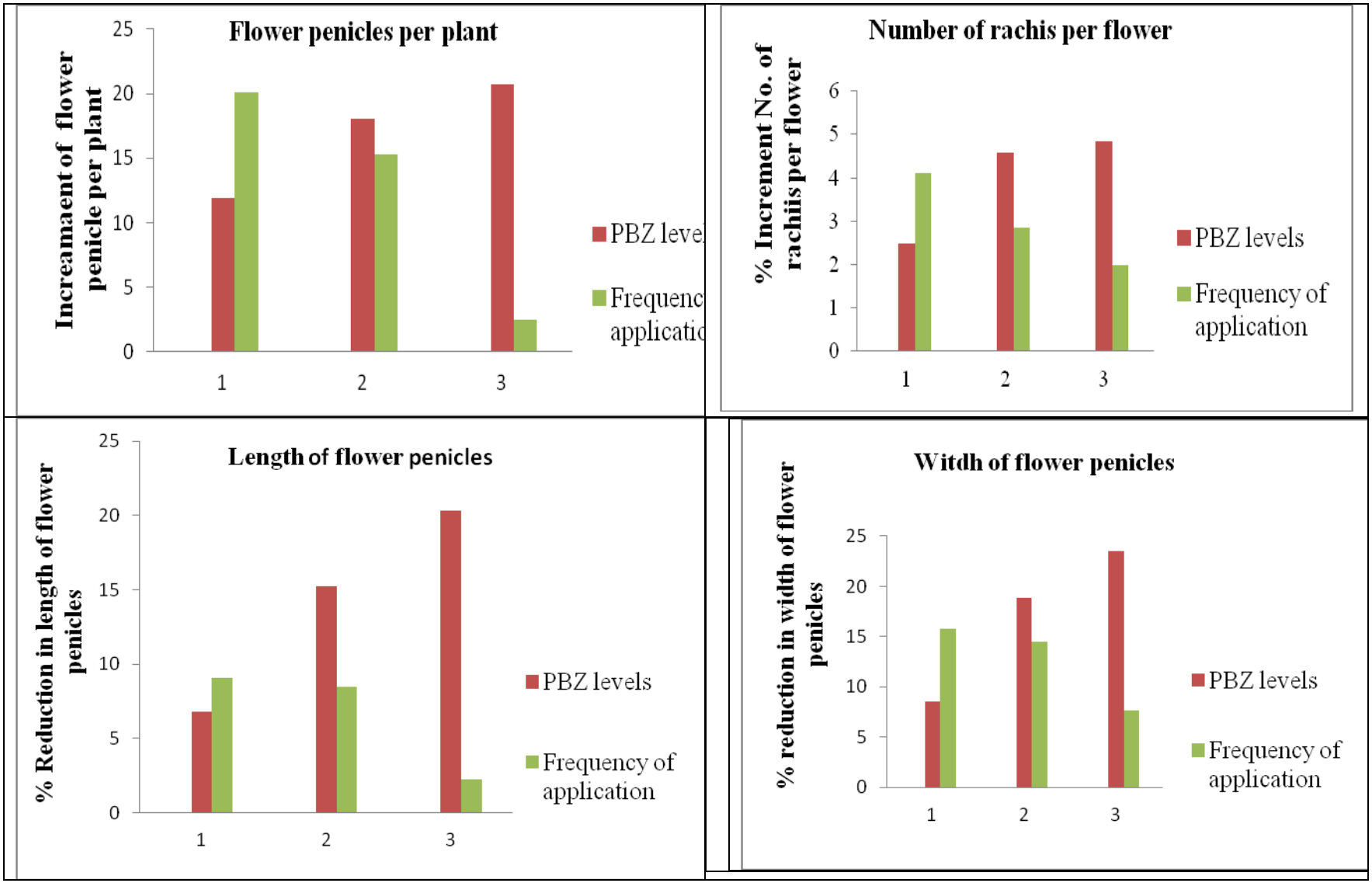
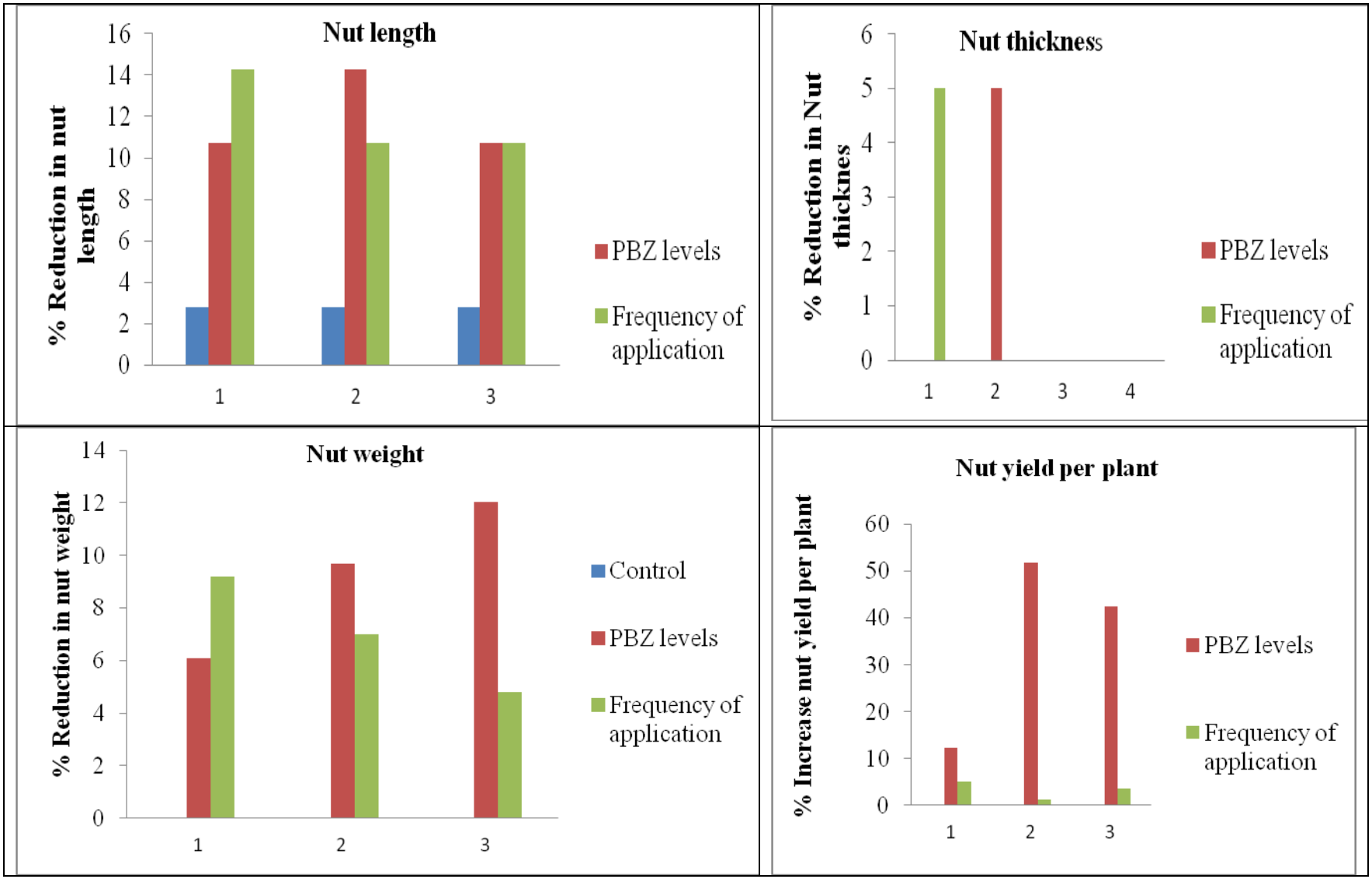


Fig.3 Effect of paclobutrazol on per cent reduction and increment of nut length, thickness, weight and yield of cashew cv. Ullal-3



The reduction in length and width on account of PBZ application could be due to suppression of growth by paclobutrazol as the compound blocks three separate steps in the terpenoid pathway for the production of gibberellins. One of the main roles of gibberellins in trees is the stimulation of cell elongation. When gibberellin production is inhibited, cell division still occurs, but the new cells do not elongate. This results in production of shoots with the same numbers of leaves and internodes compressed into a shorter length of internodal and length and width of flower panicles. Similarly, reduction in length and width of flower panicles with the use of paclobutrazol might be due to the inhibitory effect of paclobutrazol on gibberellin biosynthesis pathway at the sub-apical meristem, which ultimately reduced cell elongation and rate of cell division and decreased the shoot growth which led to the trees of shorter the internodal length and length and width of flower panicles. The results of this study are in accordance with the findings of Martin *et al.,* (1987). In peach, soil application of PBZ could significantly reduce all growth parameters (Bikramjit Singh *et al.,* 2005).

Nut parameters

Length, width and thickness

The observation of nut characters such as nut length, width and width was recorded after imposing the treatment of paclobutrazol @ 1.0, 2.0 and 3.0 g.a.i. per plant. The annual application of paclobutrazol was found significantly effective in reducing the nut length and width while, in case of nut thickness effect was non- significant. The all doses of PBZ application significantly reduced the nut length but in case of width and thickness effect was non-significant. The interaction effect of frequency and doses significantly reduced the length but the effect on width and thickness was non-significant. The highest reduction in length width and thickness of nut (23.5, 14.3 and 5 % respectively) was associated with annual application of PBZ. The reduction of these parameters might be due to the increased percentages of flowered branches in PBZ-treated which intern lead to lower expenditure of tree reserves to the vegetative growth parameters leading consequently to no assimilate limitations (Fig. 3 and Table 3). According to Kurian and Iyer (1992), PBZ can considerably enhance the total phenolic content of terminal buds and alter the phloem to xylem ratio of the stem. Such alterations could be important in restricting vegetative growth and enhancing flowering by altering assimilates partitioning and patterns of nutrient supply for new growth. The increasing number of nuts per panicle resulted lower the nut size compared to untreated plant. The results of an experiment by Burondkar and Gunjate (1993) also indicated that PBZ application increased the number of flowering and fruiting panicles.

Nut weight, volume and yield

The observations on nut weight, volume and yield were recorded after imposition of paclobutrazol treatment. The paclobutrazol application had increased the yield per plant but the nut weight and volume got reduced with PBZ imposition. The maximum reduction of nut weight and volume (12.03 and 10.3 % respectively) was also associated with annual application of PBZ @ 3 g.a.i. per plant. The frequency of PBZ application was also found to significantly influence on nut weight (9.18, 6.99 and 4.79 % respectively) and volume (9.3, 5.6 and 4.4 % respectively) reduction with annual, biennial and triennial application of PBZ (Table 4). The interaction between frequency and doses of paclobutrazol application was also found to significant reduce the nut weight and volume of cashew.

The maximum yield increment of treated plants (51.78 %) was associated with PBZ @ 2.0 g. a.i per plant. The annual application of paclobutrazol was also found to significantly increase the yield increment (15.19%) but biennial and once in three year application was found non-significant. The interaction between frequency and doses of paclobutrazol application was also found non-significant. A significantly higher fruit set and fruit retention in the paclobutrazol treated plants had a favorable impact on culminating higher final fruit number and yield per plant. Paclobutrazol has been reported to exert influence on partitioning the photosynthates to the sites of flowering and fruit production consequent to the reduction of vegetative growth. In this context, Kurian *et al.*, (2001) reported that paclobutrazol appeared to favorably alter the source sink relationship of mango to support fruit growth with a reduction in vegetative growth. Plants treated with paclobutrazol at 7.5 g a.i. per plant of mango cv. Langra in Sabour, Bihar, India produced the highest number of fruits and yield (Karuna *et al.*, 2007). Yeshitela *et al.*, (2004) in cv. Tommy Atkins recorded yields ranging from 2-3 folds as compared to control mostly due to soil drenching of paclobutrazol. The results enumerated as above are in consonance with the results obtained in the current investigation.

References

Anonymous, 1984: Paclobutrazol, plant growth regulator for fruit. London, Fern Hurst, I.C.I. (Plant Protection Division). 35 p.

Anonymous, 2013. *Directorate of Cashew Research Puttur*-. Cashew news: 18 pp 1-12

Bikramjit Singh, Kundal G.S. and Chanana Y.R. 2005. Effect of tree spacing and Paclobutrazol on vegetative growth in Shan-e- Punjab peach. *J Res*, 42(2): 162 167.

Burondkar, M.M. and Gunjate, R.T. 1993: Control of vegetative growth and induction of regular and early cropping in 'Alphonso' mango with paclobutrazol. *Acta Horticulturae*, 341*:* 206-215.

Hoda, M.N; Sanjay, S. and Jayant, S. 2001: Effect of cultar on flowering, fruiting and fruit quality of mango cv. Langra. *Indian Journal of Horticulture*, 58*:* 224-227.

Karuna K.A. Mankar and Singh, J. 2007. Effect of urea and growth substances on yield and quality of mango cv. *Langra. Orissa J. Hort.* 35(1): 67-70.

Kulkarni, V.J. 1988: Chemical control of tree vigour and the promotion of flowering and fruiting in mango (*Mangifera indica* L.) using paclobutrazol. *Journal of Horticultural Sciences*, 63*:* 557-566.

Kurian, R.M. and Iyer, C.P.A. 1992: Stem anatomical characteristics in relation to tree vigour in mango (*Mangifera indica* L.). *Scientia Horticulturae* 50: 245-253.

Kurian, R.M.Y.T.N. Reddy, R.K., Sonkar and Reddy, V.V.P. 2001. Effect of paclobutrazol on source- sinks relationship in mango (*Mangifera indica* L.). *J. Appl. Hort.* 3(2): 88-90.

Martin, G.C., Yoshikawa F. and La Rue J.H. 1987. Effect of application of paclobutrazol on vegetative growth, pruning time, flowering, yield and quality of 'Flavocres' peach. *J Amer Soc Hort Sci*, 112: 915-21.

Misra, L.P. and Singh, R. 1991. Effect of paclobutrazol on cashew grafts in nursery. *Indian J. Plant Physiology*, 34 (1): 102-105.

Santram, 1996. High density orcharding. Mango Res Bull No 122-1996

Singh, R.N. 1987: Mango. *In:* Sethurag, M.R.; Raghavendra, A.S. *ed.* Tree crop physiology. Amsterdam, Elsevier. Pp. 287-318.

Tongumpai, P; Jutamanee, K. and Subhadrabandhu, S. 1991: Effect of paclobutrazol on flowering of mango cv. 'Khiew Sawoey'. *Acta Horticulturae*, 291*:* 67-79.

Vijayalakshmi, D and Srinivasan, P.S. 2002: Impact of chemicals and growth regulators on induction of flowering in off year mango cv. Alphonso. *Orissa Journal Horticulture*, 30*:* 32-34.

Voon, C. H; Pitakpaivan, C. and Tan, S. J. 1991: Mango cropping manipulation with Cultar. *Acta Horticulturae*, 291*:* 219-228.

Yeshitela, T.P.J. Robbertse and Stassen, P.J.C. 2004. Paclobutrazol suppressed vegetative growth and improved yield as well as fruit quality of 'Tommy Atkins' mango (*Mangifera indica*) in Ethiopia. *New Zealand J. Crop and Hort. Sci.* 32(3): 281-293.

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