LEVEL OF PACLOBUTRAZOL RESIDUES IN SHOOT AND FRUIT OF MANGO

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Paclobutrazol (PBZ) treatment and 15th October, as soil drip @ 2.3 g ai per metre tree canopy diameter on 15th September increased PBZ levels in shoot-tips, fruit mesocarp and seeds of mango cvs. Dashehari and Langra. The levels of PBZ was higher in 15 September treated tree than that of 15 October and it reaches in shoot-tip within 30 days in second year after treatment. The PBZ residues in the fruit was less than 0.004 mg/kg fruit weight which was much lower than the internationally accepted values (0.05 mg/kg fruit weight).

Key words: Mango, mesocarp, paclobutrazol.

Paclobutrazol is being commonly used for induction of flowering and fruiting in mango (Kulkarni, 1988). The PBZ was taken up through the root and was transported primarily in the xylem through stem and accumulated in the leaves and fruit (Wang et al., 1986). The residues of PBZ depends on the methods of application, doses and crop species. As it persisted 2-5 years in apple (Mauk et al., 1990), 1-3 years in peach (Erez, 1986), 1-2 years in cherry (Jacyna et al., 1989), cranberry (Me Arthur and Eaton, 1989), citrus (Wheaton, 1989) and blueberry (Spers, 1988) The maximum residue limit of PBZ accepted by F AO in apple (0.2 mg/kg) Stone fruit (0.05 mg/kg) and peach nuts (0.05 mg/kg) and persisted in fruit tissue upto 10 days (Ram et al., 1996). The accumulation of PBZ residues on the surface or inside mango fruit is unfriendly to human health and in shoot-tip as a flower inducer. The amount of PBZ required to promote flowering and fruiting in fruit crops was very less (Browning et al., 1992). Hence, an experiment was conducted to study the PBZ residues accumulation in shoot-tip, fruit mesocarp and seed.

The present investigations were carried out at G B Pant University of Agriculture and Technology, Pantnagar, U P on 16-17 year old Dashehari and Langra mango trees. Paclobutrazol was applied on two different dates i.e. 15th September and 15th October @ 2.3 g ai per metre tree canopy diameter in soil drip. The required quantity of PBZ was dissolved in 7 litre of water and poured uniformly in one tree per treatment in three replications. Paclobutrazol was not applied on control trees on both the treatment dates.

Shoot-tips, fruit mesocarp and seeds were sampled separately from each of the treated trees of Dashehari and Langra for estimation of PBZ. Apical shoot-tips, without leaves from different direction of the tree were sampled in chilled 80% methanol at monthly interval from 30th October, 1993 to 30th January, 1994. Mesocarp and seed samples were also collected in chilled 80% methanol from mature fruit. The samples were blended with chilled 80% methanol and extracted 5 times with 5 ml chilled 80% methanol for 24 hours below 10°C. The methanolic extracts of each sample were pooled separately and reduced to aqueous state in vacuo at temperature below 35°C and pH was adjusted to 3.0. The aqueous extract was then partitioned 5 times with equal volume of methylene chloride. The pH of the aqueous fraction was raised to 11.0 by adding of 8% NaHCO3 and extracted 5 times with methylene chloride. The methylene chloride was evaporated to dryness in vacuo and residue was taken up in water for estimation of PBZ.

Ascending paper chromatography was used for the separation of PBZ. The extracts equivalent to 10 g fresh weight of tissue were chromatographed by streaking at 0.5 cm wide band across Acetone : Hexane (1:2, v/v).
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The solvent was allowed to ascend upto 20 cm height on whatman paper 1 strip and dried in dark. The dried chromatogram was cut into 10 segments for bioassay of PBZ in corn root curvature test as described by Curtis (1985). Five ml test solution was poured in petriplate containing Whatman 1 filter paper. Ten seeds of corn variety Sweta, presoaked and thoroughly washed, were arranged introversely on the periphery of filter paper or chromatogram segment in petriplates for 72 hours in dark at 25 ± 1°C. The number of roots having more than 90° curvature were counted after 72 hours for estimation of PBZ. The data obtained were statistically analysed by complete randomized design.

Data presented in Fig. 1 A,B shows that Dashehari and Langra shoot-tip contained low levels of PBZ in 1993-94 as compared to 1994-95 and there was little difference between 15th September and 15th October treatment dates. Paclobutrazol reaches to shoot-tip 90 days in 1993-94 after the treatment date. However, in 1994-95 when addition dose of PBZ was applied on 15 September and 15 October, detection was possible within 30 and 60 days respectively. The concentration of PBZ progressively increased upto 90 days in Dashehari and 120 days in Langra in 1993-94, whereas in 1994-95, increased upto 120 days in both the cultivars. Shoot-tip of control trees of Dashehari and Langra did not posses any PBZ activity. Accumulation of PBZ in shoot-tip was higher in 15th September treated tree than in 15th October. Similarly repeated treatment showed faster migration to shoot-tips from soil. This was due to the residual effect. Movement of PBZ was faster in shoot-tips of early treated tree.

Presence of PBZ in fruit and seed of cvs. Dashehari and Langra have been shown in Fig. 1. C,D,E,F. Fruit harvested from 15th September treated trees had higher level of PBZ in mesocarp and seed than those treated on 15th October. In general seeds contained higher level of PBZ than the mesocarps and PBZ levels were also higher in 1995 than in 1994 indicating residual effect in soil, which causes abnormalities like multibranching in seedling (Singh, 1998). In general, PBZ content of fruit was less than 0.004 mg/kg fruit weight which was much lower than the international value (0.05 mg/kg fruit weight).

REFERENCES


