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Effect of differential nitrogen doses on yield, fruit quality and foliar nutrient concentration of water apple (*Syzygium javanica)*

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Water apple (*Syzygium javanica* syn *Eugenia javanica*), a member of family Myrtaceae, is one of the important underutilized tropical fruit crops, cultivated in limited areas in Eastern India and neighbouring countries. The fruits are mainly consumed as fresh due to its delicious taste. Meager information/literature are available regarding its nutritional requirement for sustainable production of quality fruits. Hence, an investigation was made to find out the effect of different levels of nitrogen on yield, fruit quality and foliar N, P, and K status in water apple grown in laterite soil. For knowing values of N, P and K in leaves, time of its collection, i.e. maturity of leaves, is very important for water apple, no such data is available in this aspect and therefore an investigation was made in this direction also.

The experiment was conducted at MPS Farm, Dighisole, Jhargram, Paschim Midnapore on 10 year old mature trees of water apple during 2007-2010. The soil of the experimental orchard was collected before starting of experiment and analyzed. The soil was laterite having surface soil pH 5.5, EC 0.14 d/Sm and available N, P and K were 160, 82 and 170 kg/ha respectively. The treatment included as nitrogen at 0, 100, 200 and 300 g/tree/year, applied at two splits, i e March and September in every year. Each tree was fertilized with 20 kg FYM, 100 g P_2O_5 and K_2O per tree/year in two splits, i e March and September. The manures and fertilizers were applied at 3 feet away from the trunk in a circular trench of 2 feet wide and 1 feet depth. The experiment was adopted following Randomized Block Design having six replications.

For estimation of N, P and K, the newly emergent leaves were tagged in each tree for monthly collection. The leaves emerged in March which were collected in April was considered as one month old and thus, age of leaves was calculated. In each time, 30 leaves/tree was collected for estimation of N, P and K. The yield data was calculated on the basis of total fruits harvested/tree and weighted. Physico-chemical analysis of fruits was made on 20 fruits/tree basis. Leaf N was estimated using micro-kjeldahl method, P by vandomolybdophosphoric acid method and K by flame photometer.

The data in Table 1 indicated that the highest yield was associated with the application of 200 g nitrogen/tree and it was calculated as 53.8% increment over control. Beneficial role of nitrogen application in yield increment may be explained from the fact that nitrogen is the main constituents of diverse types of metabolically active compounds (Agarwala and Sharma 1978). Additional nitrogen application help to synthesis of reserve food which resulted in more flowering and fruiting in the plants. The fruit yield/ tree was decreased beyond 200g N/tree and similar observation was also noted by Tarai and Ghosh (2005) in aonla under similar agro-climatic condition. It was further noted that highest yield was associated with the foliar N value of 1.40 to 1.44%. The highest fruit weight (35.0g) with maximum in size (5.3 cm × 5.6 cm) was also recorded from the tree, fertilized with 200 g nitrogen/year. The other quality parameters like juice content and fruit acidity were not significantly varied due to different levels of nitrogen application.

It was observed that foliar N content (Fig 1) under various treatments increased with the increase level of nitrogen up to 200g/tree and thereafter, it decreased in most of the months. The foliar P content under different treatments as observed in different months, did not follow a systematic pattern, however, the leaf P content slightly increased in the trees, received with N @100 g/tree/year. This result indicates that N and P had an antagonistic relationship in foliar status of water apple. Like nitrogen, foliar K content was increased with increase in level of nitrogen up to 200 g/tree/year irrespective of month of sampling.

An overall assessment of the results obtained from the 3 years experimentation indicate that the nitrogen content in leaves varied at different age of leaves (Fig 1). The younger leaves, i e 1-4 months old contain lower level of nitrogen (0.86–1.20%) while the older leaves, i e 11-12

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Table 1 Effect of levels of nitrogen on yield and fruit quality of water apple (Jamrul)

Treatment/tree/year	Fruit yield/tree (Kg)				*Weight of fruit (g)	*Length of fruit (cm)	*Breadth of fruit (cm)	*Juice content (%)	*TSS (°B)	*Acidity (%)	*TSS/ acid ratio
	2008	2009	2010	Average							
N_0 : Control (No nitrogen)	4.0	21.0	14.0	13.0	29.0	5.0	5.4	69.3	5.0	0.30	16.7
N_1 : Nitrogen – 100 g	4.7	20.4	19.9	15.0	33.0	5.1	5.4	69.2	5.2	0.27	19.3
N_2 :Nitrogen – 200 g	8.0	28.5	23.5	20.0	35.0	5.3	5.6	70.6	6.0	0.30	20.0
N_3 :Nitrogen – 300 g	9.5	28.0	21.0	19.5	34.5	5.2	5.5	69.8	5.5	0.29	19.0
CD (P=0.05)	0.6	0.4	0.7	0.5	1.2	N.S.	N.S.	N.S.	0.2	NS	

* Average of 3 years

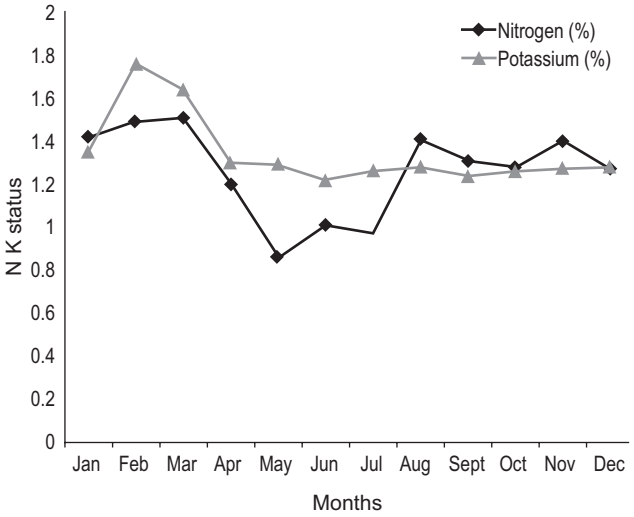

Fig 1 Monthly changes in leaf N and K content of water apple

month old had the highest level of nitrogen (1.49 to 1.51%). The leaf nitrogen content did not vary so much in the month of September and October, when age of the leaves was 6-7 month and that time, average foliar N content was 1.31–1.28%. The foliar P content was also varied with aging of the leaves (Fig 2). The youngest leaves, i e one month old leaves had the higher 'P' values (126.8 mg %) and the mature leaves contained the lower 'P' values (75.5–91.3 mg %). The P content in leaves, collected in July–August

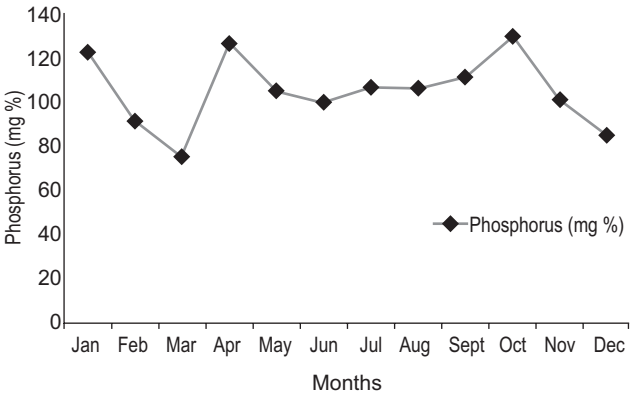

Fig 2 Monthly changes in leaf P content of water apple

(4-5 month old), found a static level (106.8–106.3 mg %). The K content in leaves of water apple did not vary so much (1.22–1.30%) with aging of the leaves, except in case of older leaves (Fig 1). Highest K content (1.76%) was noted in the month of February when age of the leaves was 11 month. It was further noted that foliar K level was more or less same in July–August (1.26–1.28%), when age of the leaves was 4-5 month. Variation in nutrient concentration in leaves in different months was also observed in guava (Sanyal and Mitra 1990), litchi (Sanyal and Mitra 1990), mandarin orange (Srivastava *et al.* 1994) and pomegranate (Singh *et al*. 1998) and recommended that the time of leaf sampling in respective fruit crop should be done when nutrient concentration in leaves is stable.

SUMMARY

An investigation was made to know the effect of different levels of nitrogen on yield, fruit quality and foliar N, P and K status of water apple (*Syzygium javanica*) grown in laterite soil. The attempt was also made to find out the best time for leaf sampling for N, P and K estimation in water apple. There were four treatments, nitrogen at 0, 100, 200 and 300 g/tree/year which were applied at two splits, i e March and September following randomized design having six replications. Three consecutive years of investigation indicated that application of nitrogen at 200 g/tree along with 100 g P_2O_5, 100 g K_2O and 20 kg FYM resulted in highest fruit production which was associated with the foliar N values of 1.40 to 1.44 %. The best time of leaf collection in water apple for N was the month of September–October (6-7 month old leaves) while for P and K it was July–August (4-5 month old leaves).

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