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Assessment of Yield Loss in Guava Owing to Fruit Anthracnose

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Abstract: Guava fruit weight loss owing to anthracnose (*Colletotrichum gloebsporioides*) severity was estimated on the basis of critical point model. Gradient of fruit anthracnose severity was created through varied levels of fungicide spray. Percent fruit weight loss ranged from 16.4% (Deshi) to 30.4% (Kazipeyara). Percent fruit weight loss was positively correlated with fruit anthracnose level. Regression coefficients in both cases were highly significant.

Key words: Guava, anthracnose, yield loss assessment

Introduction

Guava (*Pisidium guajava* L.) is a common and important fruit crop in Bangladesh. But guava plants are susceptible to many fungal diseases. A total of 10 diseases have been reported on guava in Bahgladesh (Meah and Khan,1987). Arnong the guava diseases anthracnose caused by *Colletotrichum gloeosporioides* Penz. is recognised as the second most serious disease, next to wilt (Meah and Khan,1988). High prevalence of the disease even in epidemic form has been reported every year from different parts of the country (Meah and Khan,1987; Rahman, 1989).

Severely anthracnose infected guava fruits become fully unfit for consumption and lose food value and market price. So anthracnose disease of guava is a serious problem in Bangladesh, especially for the commercial producers. Therefore, this work was undertaken to show how the level of anthracnose infection governs the amount of fruit loss and to determine the effective number of chemical sprays to control fruit anthracnose.

Materials and Methods

The experiment was conducted during September-August of 1995-96 at the farm of the Department of Plant Pathology, Bangladesh Agricultural University, Mymensingh. Four varieties: i) Kazipeyara ii) Mukundpuri iii) Sarupkatti and iv) Deshi were used in the experiment. The fungicide namely Tilt [Propiconazole = 1-2-(2,4-Dichlorophenyl)-4-propyl 1,3-dioxalen-2-Elmethyl 1 H-1, 2,4-Triozolel at a single standard rate (0.2%) was applied to guava plants at 10 day intervals for 0, 1, 2, 3, 4, 5 or 6 times to create infection gradient. The whole surface of the plant including both surface of leaves, buds, twigs, fruits and branches were well sprayed by the solution of the fungicide. Spraying was started from early fruit stage i.e., before appearance of infection. At the time of data recording, total number of fruits, healthy fruits, diseased fruits in each test plant were counted. Ten fruits were selected randomly from each plant and considering the total surface area of en individual fruit as 100%, the diseased portion of it was estimated. First recording was done 24 days after the spray and it continued for five times at an interval of 7 days i.e., up to fruit maturity. Weights of fruits selected for estimation of disease severity were also recorded after harvest. Data on fruit anthracnose severity were analysed statistically following PDI (Percent Disease Index) calculation:

$$PDI = \frac{\text{Total sum of ratings}}{\text{Number of observation} \times \text{maximum grade in the scale}} \times 100 \text{ (Singh, 1984)}$$

The data were subject to Arcsine transformation and F-test. Significant means were compared employing DMRT. Yield loss was estimated on the basis of critical point model calculated through simple regression. Critical point model (James, 1974) is based on the regression of percent yield loss against percent disease severity. The formula used is $Y = a + b\ (x_i - x)$ where Y = yield loss (%), a = intercept, b = slope (regression coefficient), x_i = per cent disease severity at a critical stage of the crop and x = average disease severity. Critical point model for yield loss assessment was applied using both the variables i.e. yield loss (Y) and disease severity (X) expressed in percentage.

The experiment was conducted following Completely Randomised Block Design (CRBD) with 3 replications. Four varieties and 7 treatments (0, 1, 2, 3, 4, 5, 6 sprays) constituted the 2- factorial experiment. The total number of treatment combinations were 84 (= 4x7x3). One plant of a single variety was used as a replication. Thus there were 3 plants of each variety to constitute 3 replications of a single treatment. Therefore, in total 84 plants were used.

Results and Discussion

The disease incidence was negligible in four varieties of guava during minor season. But during the main season the varieties were found heavily infected with fruit anthracnose.

Assessment of fruit anthracnose severity

Varietal effects: Among the varieties, Kazipeyara carried the highest fruit infection, whereas Mukundpuri had the lowest infection. Deshi variety had more infection than Mukundpuri. Sarupkatti had higher infection than Mukundpuri but less than Deshi (Table 1).

Treatment effects: The disease severity or per cent fruit infection decreased gradually with increase in number of fungicide sprays. For complete disease suppression, five sprays were required in Kazipeyara whereas in other varieties two sprays were sufficient (Table 2).

Estimation of yield loss: Under unsprayed condition in all the varieties, reduced fruit weight was obtained. In sprayed

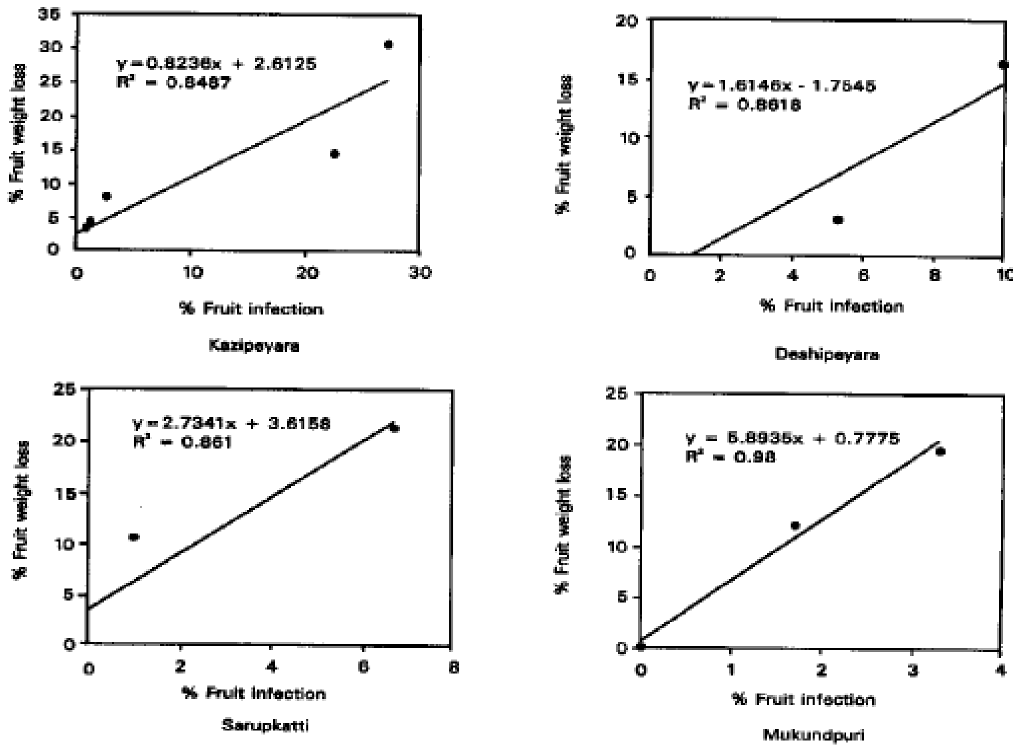

Fig. 1: Relation between anthracnose disease level and percent fruit weight loss in four varieties of guava

Table 1: Incidence of fruit anthracnose on different guava varieties during the main season (non-sprayed)

Variety	Disease severity 1% fruit infection)
Kazipeyara	27.30a
Deshi	10.00ab
Sarupkatti	6.70bs
Mukundpuri	3.30c
LSD	5.36
CV (%)	14.97

Figures in the column having same letters do not differ significantly at p = 0.01

Table 2: Severity (% fruit infection) of guava fruit anthracnose under fungicide spray gradient

Variety	No. of spray	fruit infected (Disease severity) (%)
Kazlpeyara	0	27.3a (30.98)
	1	22.7a (28.29)
	2	2.7cde (9.36)
	3	1.3def (6.54)
	4	1.Oef (5.74)
	5	0.Of (0.91)
Delhi	0	10.0b (17.68)
	1	5.3bcd (12.99)
	2	0.Of (0.91)
Serupkattl	0	6.7bc (14.59)
	1	1.0ef (5.74)
	2	0.Of (0.91)
Mukundpuri	0	3.3cd (10.4)
	1	1.7def (7.33)
	2	0.Of (0.91)
LSD		6.26
CV(%)		42.45

Table 3: Average fruit weight and % fruit weight loss in four varieties of guava under fungicide spray gradient

Variety	No. of Spray	Average fruit wt. (g)	%loss in fruit wt.
Kazipeyara	0	79.0ef	30.4
	1	95.9abcd	14.4
	2	103.0	8.0
	3	107.0ab	4.5
	4	108.0ab	3.6
	5	112.0a	0.0
Deshi	O	81.7ef	16.4
	1	94.7bcd	3.1
	2	97.7abc	0.0
Sarupkatti	O	81.3ef	21.3
	1	92.3cd	10.6
	2	103.3abc	0.0
Mukundpuri	O	65.7f	19.4
	1	71.4f	12.4
	2	81.Sef	0.0
LSD		11.21	
CV(%)		5.56	

plants, fruits grained weight which showed a continued increase in weight with increase in number of fungicide sprays. Among the varieties, gain in fruit weight was higher in Kazipeyara followed by Sarupkatti. Increase in fruit weight was lower in other varieties (Table 3).

Percent loss in fruit weight decreased with decrease in level of fruit infection owing to fungicide spray. In Kazipeyara the fruit weight loss of the unsprayed plant was 30% and it was decreased to 14.40% after one spray though disease reduction

was not significantly different. This phenomenon continued until no fruit weight loss occurred at the end of 5 sprays when virtually no fruit infection occurred. In other varieties per cent fruit weigh loss was zero with only two consecutive sprays (Table 3). The relation between disease level (% fruit infection) and per cent fruit weight loss was positively correlated and significant linear regression was obtained in all the varieties (Fig. 1). The figures indicate percent reduction in fruit weight loss at a specific level of anthracnose infection. Deshi fruits realized minimum loss whereas Kazipeyara had the more loss. Fruit weight loss was estimated following multiple-treatment experiments which allowed comparison of the effect of different levels of anthracnose. The zero level of infection as maintained through fungicide spray created basis for apparently actual fruit weight and its use for comparison with fruit weights obtained at different levels of anthracnose infection (James, 1974). Patel and Pathak (1993) reported 6.6% of guava fruit weight loss and incidence of fruit rots caused by *Colletotrichum gloeosporioides* and other fungi. Rawal (1993) used multilinear regression for assessment of relation between guava fruit weight loss and incidence of fruit rots caused by *Colletotrichum gloeosporioides* and other fungi.
Pathogen incidence and fruit weight were positively correlated with fruit rots.

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