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NECROTIC STREAK - A SYMPTOM OF KOKKAN DISEASE OF BANANA

The kokkan disease of banana, still having an unknown etiology, was first reported by Raj *et al.* (1966) from Trichur district in the variety Nendran. Now, the disease is wide spread in Kerala and varieties like Palayankodan, Kodappanillakunnan, Monthan, Kanchikela, Poovan, Karpooravally and Red Banana were found to show the symptoms of this disease. Eventhough several symptoms like longitudinal, irregular and reddish streaks of varying sizes on the leaf sheath, abnormal separation of leaf sheath from the pseudostem and lean and lanky appearance of the plant were ascribed, the bunch characters like ashy grey colour, abnormally curved fruits and reduced fingers were taken as the identifying symptoms of the disease. In addition to the symptoms described by Raj *et al.* (1966), necrotic streaks on the pseudostem, leaf petiole, midrib, peduncle and male bud were observed on the plants affected by kokkan disease. Therefore, a study was undertaken to ascertain the significance of the necrotic streaks in the kokkan disease of banana.

Two sets of 40 suckers each obtained from the kokkan affected as well as healthy mother plants of the variety Nendran were planted following the package of practices recommended by the Kerala Agricultural University (1986). Of these, six plants from the suckers of kokkan affected mother and 4 plants from the suckers of healthy mother were lost due to various reasons like non- establishment, bunchy top infection etc. Remaining plants were keenly observed at fortnightly interval for the presence and development of necrotic streaks and its intensity in individual plant was assessed with the following scale:

0	No necrotic streak
1	1 to 5 necrotic streaks
2	6 to 10 necrotic streaks
3	11 to 15 necrotic streaks
4	16 to 20 necrotic streaks
5	More than 20 necrotic streaks

and the necrotic index was worked out for each plant with the formula

$$NI = \frac{SS}{n} \times \frac{10}{MPS}$$

where NI is necrotic index, SS is sum total of necrotic score per plant, n is the number of observations and MPS is the maximum possible score.

The necrotic streaks initially appeared as a small linear necrotic area with 2-5 mm length and later extended both sides in a linear line measuring even up to 10 cm. The streaks were initially tan brown in colour later turning to dirty black. On examination, it was found that the internal tissues were rotten to a large extent, well beyond the exernally visible streaks. The necrotic streak started to appear from the sixth fortnight after sprouting and the fresh ones appeared up to harvest. Out of 34 plants from the kokkan affected mother, 33 showed the necrotic streaks while it was in 27 plants out of 36 in the case of plants from healthy mother.

Some plants showed the presence of necrotic streaks through out the growth phase by way of reappearance in freshly emerging leaf sheaths and petiole while in the majority of the

Table 1. Occurrence and masking (stability) of necrotic streaks in kokkan affected and healthy plants

Stability of necrosis	On the basis of bunch character		Total
	Kokkan	Normal	
Persisted once appeared	6	0	6
Disappeared with senescence but reappeared	6	0	6
Disappeared with senescence	28	20	48
Without necrotic streaks	0	10	10
	40	30	70

Table 2. Influence of necrotic index (per cent) on the production of kokkan bunch

Necortic index, %	Number of bunches		Total
	Kokkan	Normal	
0.00 - 0.99	0	10	10
1.00 - 1.99	0	0	0
2.00 - 2.99	0	1	1
3.00 - 3.99	0	10	10
4.00 - 4.99	2	4	6
5.00 - 5.99	7	3	10
6.00 - 6.99	4	2	6
7.00 - 7.99	5	0	5
8.00 - 8.99	3	0	3
9.00 - 9.99	2	0	2
10.00 - 10.99	2	0	2
11.00 - 11.99	3	0	3
12.00 - 12.99	1	0	1
13.00 - 13.99	2	0	2
14.00 - 14.99	2	0	2
15.00 - 15.99	1	0	1
16.00 - 16.99	0	0	0
17.00 - 17.99	2	0	2
18.00 - 18.99	1	0	1
19.00 - 25.99	0	0	0
26.00 - 26.99	1	0	1
27.00 - 27.99	1	0	1
28.00 - 32.99	0	0	0
33.00 - 33.99	1	0	1
	40	30	70

cases, the presence of necrotic streaks ceased along with the senescence of affected leaf sheath and petiole (Table 1). The reasons for this phenomenon is not clear.

Raj *et al.* (1966) described the kokkan bunch as having grey colour with curved and reduced fingers. But this study showed that the colour of the bunch may vary between greyish green and pale green at three-fourth maturity and the curvature may be very slight to acute. All the plants which had the necrotic streaks continuously up to the harvest produced only the kokkan bunches. The plants which showed the necrotic streaks once, later disappeared for few fortnights and again appeared to persist up to harvest also produced typical kokkan bunches. The other group which had the necrotic streak for a short period of its growth phase, produced either normal or kokkan bunches. All the plants which showed no necrotic streaks produced normal bunches (Table 2).

An attempet was made to establish the relationship between the intensity of necrotic streaks and the production of kokkan bunches. The data presented in Table 2 clearly showed that all the plants which had the necrotic index below 3.99 produced normal bunches while the plants with an index between 4.00 - 6.99 either produced kokkan bunch or normal bunch. The type of bunch produced seemed to be mainly depended up on the extent of damage made to the internal tissues due to necrotic streaks. All the plants which showed a necrotic index above 7.00 produced only kokkan bunches. Therefore, it can reasonably be concluded that necrotic streak is one of the indicative symptoms of the kokkan affected plants and the production of kokkan bunch mainly depends up on the severity of the necrotic streaks. Sice the kokkan plants with less necrotic streaks are not producing the abnormal bunches of typical kokkan plants, the bunch character could not be taken as a sole character of identifying the kokkan disease.

The most characteristic symptom of this disease is the presence of necrotic streaks on leaf petiole and pseudostem and the production of infected bunches depend on the intensity and duration of existence of these necrotic streaks.

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