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Field reaction of ginger germplasm to *Phyllosticta zingiberi*

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Abstract : One hundred ginger germplasm accessions were evaluated for their reaction *Phyllosticta* leaf spot under field conditions. The disease was scored on 1 to 9 scale. Eleven accessions were tolerant and 42 accessions were moderately tolerant.

Keywords : Ginger, leaf spot, *Phyllosticta zingiberi*

Ginger is grown over an area of 53,462 ha with a production of 1,70,584 tonnes in India (Anony., 1994). In Kerala, it is grown over an area of 15,400 ha with a production of 50,275 tonnes (Anony., 1994). Leaf spot of ginger caused by *Phyllosticta zingiberi* Ramkr. is one of the important foliar diseases threatening production of ginger. This disease was reported for the first time in India by Ramakrishnan (1942). Since then, it was reported from Philippines (Chanliongco, 1966) and Mauritius (Anony., 1971). In India, it was reported from Maharashtra (Kaware, 1974), Himachal Pradesh (Sohi *et al.*, 1973) and Kerala (Anony., 1974). Not much is known about the reaction of various cultivars of ginger to the leaf spot pathogen. In an earlier study, Nybe and Nair (1979), and Premanathan *et al.* (1980) have reported the screening of some cultivars to locate tolerant or resistant types. The present paper contains the results of study on field tolerance of ginger germplasm to *P. zingiberi*.

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MATERIALS AND METHODS

The experiment was conducted during the years 1990 and 1991 in a randomised block design with two replictions at National Research Centre for Spices, Research Farm, Peruvannamuzhi. One hundred ginger germplasm were grown in 45 cm diameter cement pots each carrying approximately 50 kg soil during May-June.The cement tubs were filled with a potting mixture consisting of 2:1:1 soil, sand and well decomposed cowdung. Four rhizome pieces of 25 g each of the accession were sown in the pots and covered with green leaf mulch. A fertilizer mixture consisting of 2.5 g potash, 15.0 g super phosphate was applied as basal dressing while 2.5 g potash, 2.5 g urea were applied as top dressing 120 days after planting for each pot. 50 g neem cake was applied per pot as basal dressing. Adequate irrigation was given as and when required. The pots were drenched with Fytolan at 2.5g/lit to control soft rot of ginger. Monocrotophos (0.05 %) was sprayed to control shoot borer. As there was heavy incidence of *Phyllosticta* leaf spot in both the years, the accessions were scored for

the disease incidence under natural conditions without artificial inoculation. Disease scores were recorded on a 1-9 scale during October and November as follows. 1= no disease; 2=1-2 spots; 3= 3-5 spots; 4= 6-9 spots; 5= 10-15 spots; 6= 25-30 per cent of leaf areas covered and 9 = completely dried up. Observations from ten randomly selected leaves were recorded on each of the accession and disease index was worked out using the formula:

$$\text{Disease index} = \frac{\text{Grade} \times \text{Number of leaves falling}}{\text{Total number of leaves}}$$

Table 1 : Field reaction of ginger accessions to *Phyllosticta zingiberi*

Accession	Disease Index 1990	1991	Pooled value
PGS-17	1.32 (T)	6.45 (HS)	4.08 (S)
PGS-20	1.42 (T)	3.35 (S)	2.25 (MT)
PGS-26	1.36 (T)	1.30 (T)	2.40 (MT)
Sleeva local	1.10 (T)	1.30 (T)	1.15 (T)
Sivara. local	1.45 (T)	1.10 (T)	1.10 (T)
Sel. No. 620	1.22 (T)	5.90 (HS)	3.67 (S)
Sel No. 636	1.24 (T)	1.10 (T)	1.25 (T)
Sel No. 666	1.35 (T)	5.35 (S)	3.52 (S)
Sel No. 190	1.13 (T)	2.95 (MT)	2.10 (MT)
Sel No. 128	1.50 (T)	6.90 (HS)	5.45 (HS)
Neela maran	1.32 (T)	3.55 (MS)	2.60 (MT)
Sel. No. 638	2.22 (MT)	1.68 (T)	1.85 (T)
Sel No. 603	1.95 (MT)	1.10 (T)	1.80 (T)
Sawthingpui	3.02 (MT)	1.10 (T)	1.30 (T)
Sel. No. 641	1.90 (MT)	1.11 (T)	1.40 (T)
Dhiphu	2.10 (MT)	1.20 (T)	1.60 (T)
Maranmachiplavu	2.40 (MT)	1.50 (T)	1.98 (T)
Burdwan	3.15 (MT)	1.20 (T)	2.02 (MT)
Wynad local	4.50 (S)	1.40 (T)	2.85 (MT)
Sel. No. 603	2.50 (MT)	1.20 (T)	2.80 (MT)
UP local	4.10 (S)	1.40 (T)	2.85 (MT)
Vengara	3.90 (MT)	1.70 (T)	2.73 (MT)
Karakkal	4.30 (S)	1.30 (T)	2.80 (MT)
MEAN	3.06	3.32	3.13
SD	1.25	1.47	1.15

T = Tolerant. MT = Moderately tolerant.
S = Susceptible. HS = Highly susceptible.

RESULTS AND DISCUSSION

The disease was observed as minute oval thin papery spots with white centre and dark brown margins. Most of the spots were individual, however, the spots enlarged in due course of time and coalesced. The central portion of the spot fell of leaving a typical shot hole symptom which was observed right from August till November. In severe infections, the coalesced spots formed necrotic patches leading to drying up of leaves. Disease reacton was recorded during peak disease periods, viz., October and November on a 1 to 9 scale as described. The average disease index, mean and standard deviation were worked out. The field reaction of tolerant ginger lines with disease index less than mean-SD in either of the year only is given in Table 1. No accession of ginger was free from the disease. Abundant natural inoculum was prevalent which was determined by the presence of spots in all the varieties in all the blocks. All the ginger lines were classified into four categories, viz., tolerant, moderately tolerant, susceptible and highly susceptible as shown in Table 2. The varieties having a disease index less then (mean -SD) are categorised as tolerant. The mean minimum and maximum temperature from August to November (20°C to 35°C) and relative humidity of 60-80 per cent were congenial for the development of leaf spot of ginger. The rainfall received from August to

Table 2 : Reaction of ginger germplasm to *Phyllosticta zingiberi*

Disease reaction	Category	Number
Tolerant	< Mean-SD	11
Moderately tolerant	Mean-SD to Mean	42
Moderately susceptible	Mean to Mean + SD	27
Highly susceptible	> Mean + SD	20

November ranged from 70 to 377 mm spread over 19 days. The sunshine received during the above period ranged from 165-188 bright sunshine hours per month. Nybe and Nair (1979), while screening the ginger lines to *Phyllosticta* leaf spot, classified all the lines into five categories as healthy, light, medium, severe and very severe infection based on 0-5 scale. They reported Tafingiva as the most tolerant cultivar followed by Maran, Bajpai and Nadia. Premanathan *et al.* (1980) reported that varieties Maran and Karakkal were resistant, while they were found to be completely susceptible under Peruvannamuzhi conditions. Dohroo *et al.* (1986) screened the ginger lines based on 0-5 scale and categorised them into four groups depending on intensity of disease as resistant (0-10%), moderately resistant (11-20%), susceptible (21-40%) and highly susceptible (40%) and none of the lines were completely immune to *Phyllosticta* leaf spot, however, a few lines were moderately resistant. In the present study, a refined scale of 1-9 is used instead of 0-5 scale to increase precision of scoring. The accessions found to be consistently tolerant in both the years can be used in breeding for resistance to *Phyllosticta* leaf spot in ginger.

REFERENCES

Anonymous (1974). Annual Report, Central Plantation Crops Research Institute, Kasaragod, India. 183 pp.

Anonymous (1994). Spices in different states Facts & Figures Spices Board, Kochi. 93 pp.

Chanliongco, R.C. (1966). Leaf spot diseases of ginger. *Agriculture et Los Bonos* **6**: 16-18.

Dohroo, N.P., Shyamm, K.R., Bharadwaj, S.S. and Korla, B.N. (1986). Reaction of ginger germplasm to *Phyllosticta* leaf spot. *Indian Phytopath.* **39**: 605.

Iyer, R. (1987). *Diseases* of *Ginger.* Rev. Trop. Plant Pathology, Today and Tomorrow Publishers, New Delhi. 4: 251-288.

Kaware, H.T. (1974). *Studies on leaf spot of ginger caused by Phyllosticta zingiberi.* M.Sc. thesis. Punjabrao Krishi Vidyapeeth, Akola, India. 53pp.

Nybe, E.V. and Nair, P.C.S. (1979). Field tolerance of ginger types to important pests and diseases. *Indian Arecanut, Spices & Cocoa J.* **2**: 109-111.

Premanathan, T., Peethambaran, C.K. and Abi Cheeran (1980). Screening of ginger cultivars against *Phyllosticta* leaf spot. *Proc. of National Seminar on Ginger and Turmeric* Calicut. April 8-9, 1980. pp. 126-127.

Ramakrishnan, T.S. (1942). A leaf spot disease of ginger caused by *Phyllosticta zingiberi* sp. n. *Proc. Indian Acad. Sci.* **15**: 167-171.

Sohi, H.S., Sharma, S.L. and Varma B.R. (1973). Chemical control of *Phyllosticta* leaf spot of ginger (*Zingiber officinale*). *Pesticides* **7**: 21-22.