

A New Virus Disease of Groundnut in Tamil Nadu

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ABSTRACT

The occurrence of a new virus disease affecting groundnut causing considerable loss has been observed in Tamil Nadu. This disease was found to be distinct from other virus diseases of groundnut and the virus causing the disease is designated as groundnut ring mosaic virus.

INTRODUCTION

Groundnut (Peanut) is known to be infected by several virus diseases like rosette, mosaic, chlorosis, marginal chlorosis, ringspot, ring mottle, bunchy top, witches' broom etc. Reddy *et al.* (1968) described a virus disease of groundnut which was named as bud necrosis. A similar disease in Punjab was reported by Chohan (1967), but it was called as bud rot or bud blight. Some of the symptoms described by these workers have been found to be associated with a disease of groundnut, the occurrence of which is widespread in Coimbatore and Tiruchirapalli districts of Tamil Nadu. Detailed studies have been taken up to assess the nature of this disease and the results are reported in this communication.

MATERIALS AND METHODS

The transmission of the disease from infected groundnut plants to healthy POL 1 groundnut was attempted by the usual sap inoculation methods using different buffers like

0.1M phosphate, Sodium sulphite, Borate, Tris, Ethylene diaminetetraacetate (EDTA), and Best's buffer (Best, 1968). Twenty five plants were inoculated using each buffer. Side wedge grafting was followed for large scion shoots from infected plants. Single leaf grafting was also attempted using young leaves showing clear symptoms of the disease. Seeds from artificially inoculated plants were collected and sown in pots to find out the possibility of the disease being transmitted through the seeds.

RESULTS AND DISCUSSION

A. Transmission: The transmission of the disease was successful by side wedge grafting of infected shoots or single leaves. Single leaf graft transmission was found to be desirable as the injury to the healthy plant could be minimised and also large number of plants could be inoculated with leaves taken from a single infected plant. Chohan (1967) could transmit the bud blight disease by cleft graft and approach graft but not

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by single leaf grafts. The present disease was not sap inoculable with different buffers tried but, Chohan (1967) was able to transmit the bud blight disease to groundnut and eight other host plants by sap transmission employing sodium sulphite buffer. It is not clear from his report, whether the inoculated plants developed systemic symptoms because only the development of "very minute straw-coloured lesions on all inoculated leaflets" is mentioned. The present disease was not transmissible through the seeds, since none of 252 seeds obtained from artificially infected plants produced infected plants under glass-house conditions.

B. Symptomatology: The earliest symptom of the disease both under natural conditions and on artificially inoculated plants, was the formation of numerous chlorotic specks on the unopened youngest leaves. The chlorotic specks developed into well defined chlorotic rings (Plate I A) which soon covered the entire lamina. Depending on the variety of groundnut, chlorotic rings turned necrotic sooner or later. When necrosis of the ringspot was well advanced, the leaf petioles were twisted and they slightly drooped down. The leaves then began to dry up. The necrosis of the terminal bud might be seen after about 10-15 days in certain varieties and such a

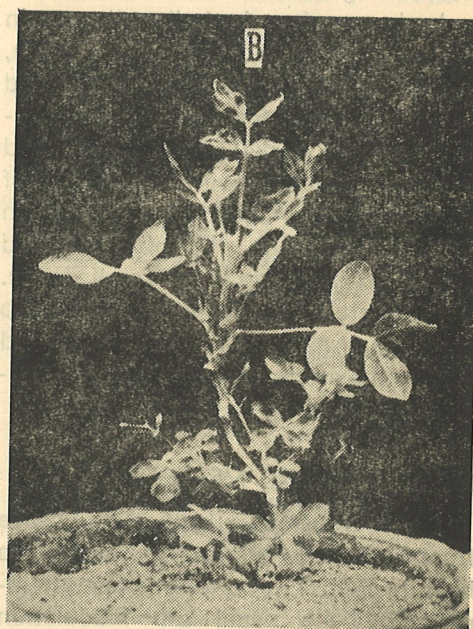
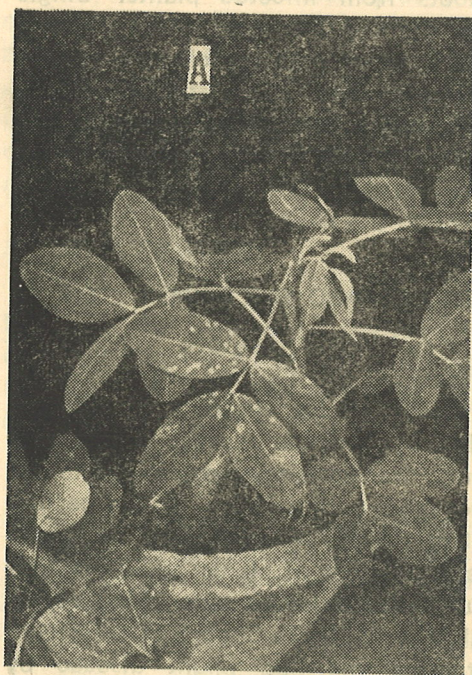


Plate I. Groundnut Ring Mosaic disease :

A. Production of chlorotic rings in the early stage

B. Mosaic patterns and laminar abnormalities in the late stage

symptom could be seen in some germplasm types of groundnut only after six to eight weeks of inoculation. The necrosis, when observed early, extended downwards ultimately killing the terminal bud and the entire main stem and sometimes the plant itself. In POL1 groundnut, which was used for all experiments, all inoculated plants did not show necrosis of the terminal bud. However, all the inoculated plants developed on the leaves chlorotic rings which later diffused into mosaic pattern. The side shoots which formed later exhibited typical mosaic or sometimes oakleaf patterns on the leaves in addition to smalling, filiformity, blistering and other malformations

of the leaves (Plate I B). The symptoms observed on the side shoots were similar, whether the terminal bud of the main stem was necrosed or not.

By single leaf graft technique two strains of the virus could be distinguished based on the symptomatology. The strain which induced necrosis of the terminal bud within two to three weeks after inoculation, is designated as the S strain (severe) (Plate II A). The second M strain (mild) caused the formation of ringspots on the leaves in the early stages, but the ringspots diffused into typical mosaic patterns and the young leaves produced subsequently showed only mosaic patterns (Plate II B).

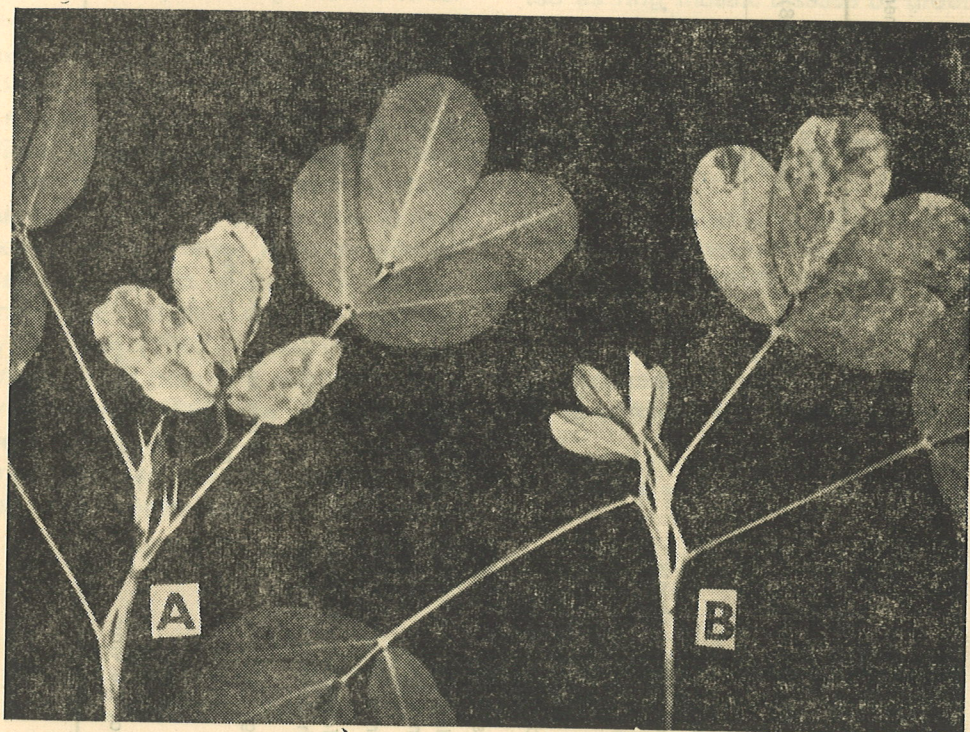


Plate II. A. Groundnut plant infected by S strain of GRMV
B. Groundnut plant infected by M strain of GRMV

TABLE 1. Comparison of ring mosaic disease with other virus diseases of groundnut

Characteristics	Ring mosaic	Bud necrosis (Reddy <i>et al.</i> , 1968)	Bud blight (Chohan, 1967)	Ring mottle (Sharma, 1966)
I. Transmission				
(a) Grafting scion shoots	Successful	Successful	Successful	Successful
(b) Single leaf graft	"	Not tested	Unsuccessful	Not tested
(c) Sap transmission	Unsuccessful	"	Successful	Unsuccessful
(d) Seed transmission	Negative	"	Negative	Positive
II. Symptoms				
(a) Production of ringspots on leaves	Present	Present	Present	Present
(b) Necrosis of terminal bud may or may not be present		Always present	Present	Absent
(c) Malformation of leaves with stunting of plants	Present	Present	Not observed	Not observed
III. Host range	Cowpea and <i>Phaseolus mungo</i> were not infected	Not tested	Cowpea reacted with local lesions and systemic symptoms and <i>P. mungo</i> showed systemic infection	Not tested
IV. Identity of the virus	Ring mosaic virus	Not established	Tomato spotted wilt virus	Not established

The necrosis of the terminal bud may or may not be induced; if observed, it would be only after six to eight weeks after inoculation. The side shoots from infected plants did not show necrosis in both cases. As the disease causes chlorotic ringspots in the early stages followed by mosaic symptoms later, it is considered that it will be appropriate to name the present disease as 'Ring mosaic disease of groundnut'.

Chohan (1967) reported that bud blight virus induced local lesions followed by systemic symptom on cowpea and systemic infection on *Phaseolus mungo*. These two plant species were not infected by the ring mosaic virus. Chohan (1967) suggested that the bud blight disease might be due to Tomato spotted wilt virus. However, the susceptibility of tomato to bud blight virus was not tested by him. It was observed in the present study that tomato was not susceptible to ring mosaic virus. Hence it is considered that ring mosaic disease is distinct from bud blight disease reported by Chohan (1967). The ring mosaic virus differed from ring mottle reported by Sharma (1966) in the positive seed transmission of ring mottle virus, whereas the ring mosaic virus was not transmitted through seeds

(Table 1). The ring mottle virus caused neither necrosis of the terminal bud nor leaf abnormalities as the ring mosaic virus. Reddy *et al.* (1968) after a preliminary study proposed the name 'bud necrosis' based on the constant production of necrosis of the terminal buds of all infected groundnut plants. It is difficult to compare the present disease with bud necrosis disease, as the information available is limited. However, the necrosis of terminal bud has not been observed to be a constant symptom associated with plants infected by ring mosaic virus. Based on the differences noted, the present disease caused by ring mosaic virus is considered as distinct and designated as ring mosaic disease of groundnut.

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