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PHYLLODY, A NEW DISEASE OF GREEN GRAM (*PHASEOLUS AUREUS* ROXB.) IN TAMIL NADU

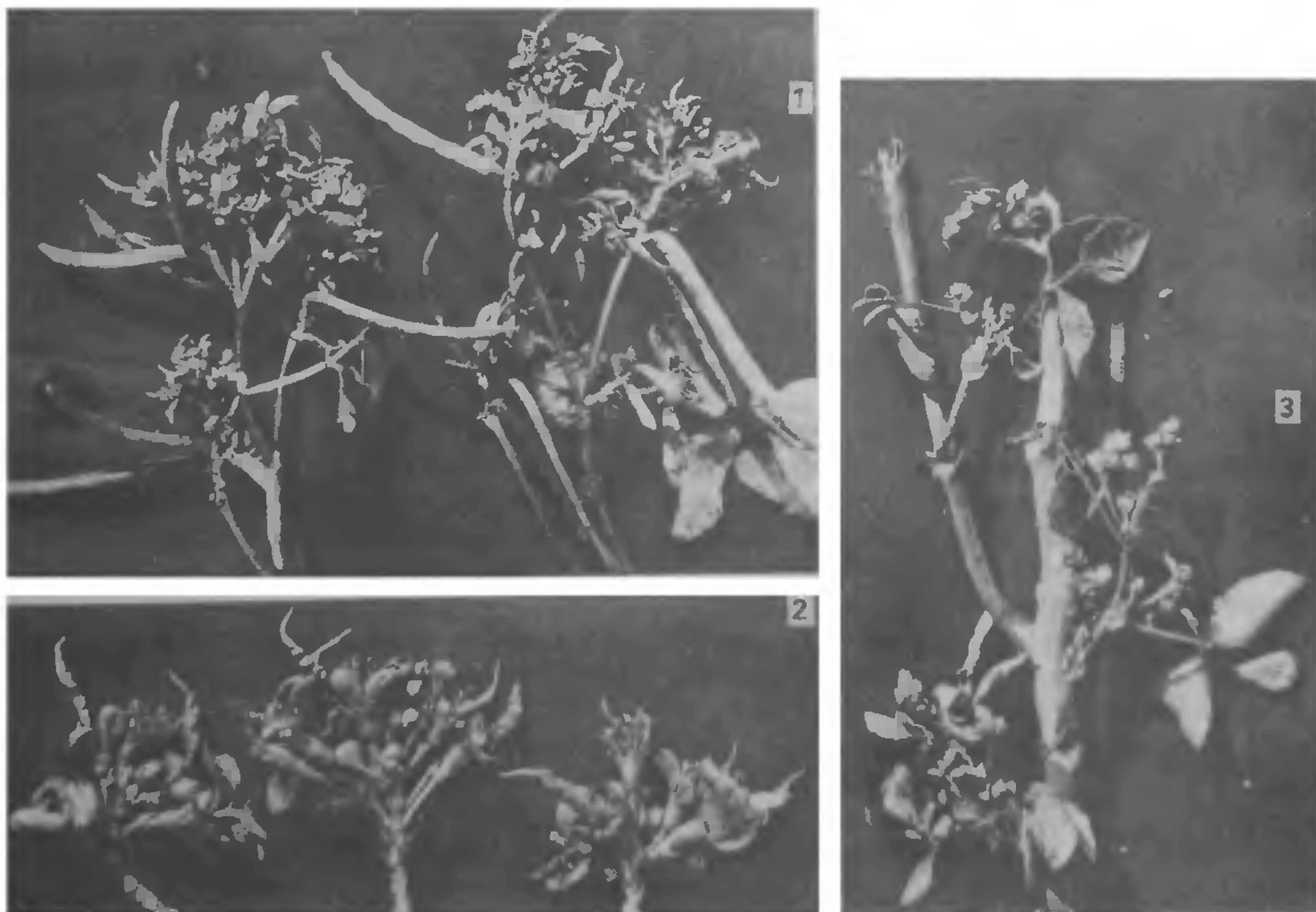
P. LAKSHMANAN, R. RABINDRAN,
K. PILLIARSAMY and S. MOHAN

Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore 641 003, India.

GREEN gram (*Phaseolus aureus* Roxb.), one of the most important pulse crops of Tamil Nadu, is extensively cultivated as a companion crop with cereals, cotton and groundnut. Since the average diet of the Indian population is deficient in protein content there is need for increase in its production.

Intensive cultivation practices often create new disease¹. During March–April 1986, the experimental plots (var. Co. 2) in our university farm were severely affected by a disease, causing the production of phylloid flowers. The disease was characterized by stunting and smalling of leaves in the initial stages. Later, when the plants reached the flowering stage, the floral parts were transformed into green, leaf-like structures followed by abundant vegetative growth (figure 1). The sepals usually big in size became leaf-like structures. The veins of the petals and sepals were thickened and appeared prominent (figure 2). Nearly 18% of plants exhibited phylloid flowers. The production of side branches and shoots from the base of the plants were increased (figure 3) in comparison with the healthy plants. There was drastic reduction in the 1000 grain weight as well as the number of grains per capsule (table 1).

Attempts to transmit the disease through sap inoculation were unsuccessful. By side wedge grafting the disease was successfully transmitted on 25-day-old Co. 2 green gram plants. Infected termin-



Figures 1–3. 1. Green leaf like structure and abundant vegetative growth of the flowers; 2. Prominent and thick veins of the petals and sepals, and 3. Production of side shoots in the infected plants.

Table 1 Difference between healthy and infected plants

Characters	Healthy (Average of 20 plants)	Infected
Number of branches per plant	6.0	14.8
Production of shoots from base of the plant	0.5	35.0
Number of grain per capsule	9.5	1.17
1000 gram weight	54.76 g	5.16 g

al shoots with phylloid flowers were used as scion for grafting. The inoculated plants in green house (28–30°C) showed chlorosis with marked reduction in the leaf size. These early symptoms were visible 20 days after inoculation. When the flowers were produced, they were characteristically phylloid. It appeared that when the flowers were partially infected, pod formation was only partial. Based on these symptoms the disease is named as 'Phyllody'.

The disease was artificially induced on a 25-day-old *Vigna sinensis* (Torner) Savi (var. C. 152), *Phaseolus Mungo* var. *radiatus* L. (var. Co 2) and *Sesamum indicum* L. (var. TMV. 3) by side wedge grafting. These crops produced typical phylloid symptoms in 30–35 days. Production of new shoots from closely placed axils due to possible stimulation of axillary buds resulted in crowding of shoots at apical portions, giving a bushy appearance to the plants. The symptoms described on green gram, cowpea, black gram and sesamum are similar to those described by Ramiah and Narayanasamy on cowpea² and by Vasudeva and Sahambi on sesamum³.

The similarity of the symptoms due to the phyllody diseases observed on green gram, black gram, cowpea and sesamum suggests that the causative agents of the phyllody diseases might be related to each other. To test this assumption cross-inoculation test was carried out. The results indicate that the agents causing phyllody diseases of these crops might be related to each other. The occurrence of Phyllody on green gram has not been reported so far and this appears to be the first record.

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A NEW SPHENOPSISID FROM THE BARAKARS OF THE SOUTH KARANPURA COALFIELD, BIHAR, INDIA

D. E. P. JEYASINGH

Department of Botany, Madras Christian College, Tambaram, Madras 600 059, India.

THE Sphenopsida is represented meagrely in the Indian Gondwana flora. The lower Gondwana sediments contain a greater number of genera and species of sphenopsids compared to the upper Gondwana rocks¹. In the lower gondwanas the following genera are recorded: *Trizygia* Royle (= *Sphenophyllum* Koenig) belonging to the Sphenophyllales and *Schizoneura* Schimper & Mougeot, *Phyllothea* Brongniart, *Stellothea* Surange & Prakash (= *Lelstheca* Maheshwari), *Raniganjia* Rigby, *Barakaria* Feistmantel and the questionable *Diphyllopteris* Srivastava² belonging to the Equisetales. The arborescent and hence robust representatives of the Calamitales are said to be absent in the Gondwana flora¹. Of the equisetalean genera mentioned above, *Phyllothea* is represented by about eight species, *Schizoneura*, *Raniganjia* and *Stellothea* (= *Lelstheca*) by two species each and *Barakaria* and *Diphyllopteris* by one species each.

During a fossil collection trip to the South Karanpura coalfield in Bihar some years ago, the present author collected from the Barakar sediments near Argada Colliery, several fragments of a sphenopsid that do not fit the description of any of the lower Gondwana sphenopsid species mentioned above. The leafy plant fragments are preserved as an overlapping tangle of impressions on hard shale of a light grey colour. The whorl of leaves at each node of the stem forms a cup-like sheath at the base (figure 1) and the linear, free distal parts of the leaves are as much as 6–8 cm long and about 3–5 mm wide. There are about 6–8 leaves per node (only 4 in some), though only half this number are visible at any one place in the impressions. The leaves show a strong unbranched midrib, and in some places, the characteristic transverse wrinkling on the lamina reported in *Barakaria*³ and *Stellothea*⁴. The leaf-bearing axes are about 5 mm in