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ASSOCIATION OF A MYCOPLASMA-LIKE ORGANISM WITH PIGEONPEA PHYLLODY

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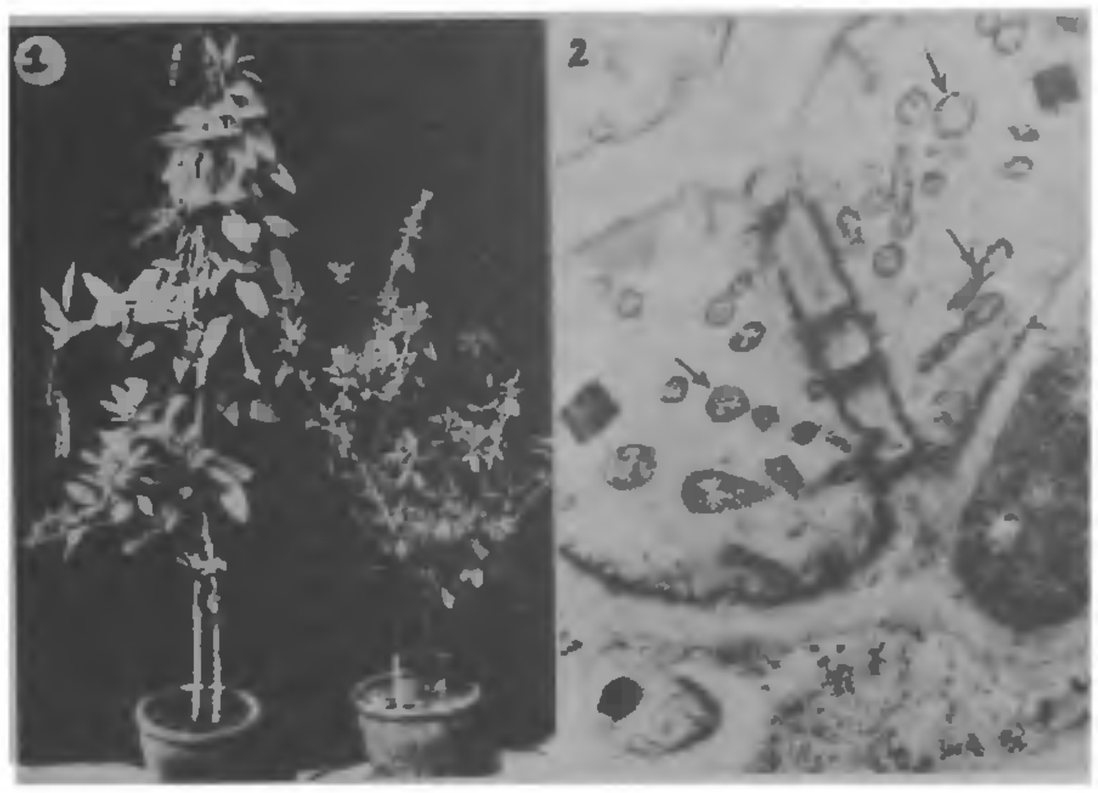
ALTHOUGH phyllody in pigeonpea was reported from Kanpur[1] in 1966, it was considered to be due to natural variation[2]. During 1981–82, this disease was reported from Karnataka and the symptoms were reproduced on healthy pigeonpea plants by grafting but not by mechanical sap inoculation[3]. The most characteristic symptom of the disease is the production of phylloid flowers (transformation of floral organs into leaf-like structures) accompanied by shortening of internodes, axillary proliferation of branches, reduction in leaf size and stunting of plants (figure 1). In recent years, there has been considerable increase in the incidence of the disease in most of the pigeonpea growing areas of Karnataka. The etiological agent of the disease was confirmed by the following electron microscopic studies.

Leaves from the diseased pigeonpea plants were cut into small sections of 1 × 1.5 mm and fixed in 3% glutaraldehyde for 24 hr. Then the tissues were washed for 30 min in 0.1 M phosphate buffer (pH 7.3) containing 5% sucrose. They were stored overnight in cold in the same buffer. Next day, they were fixed in 2% osmium tetroxide prepared in 0.1 M phosphate buffer (pH 7.3) containing 5% sucrose for 150 min followed by washing in distilled water for 20 min. The tissues were dehydrated in 50, 70 and 90% acetone and final dehydration was carried out with three changes of 100% acetone for 20 min in each solution. Acetone-dehydrated tissues were transferred to a mixture of 100% acetone and epon (1:1) and agitated continuously for 1 hr. The tissues were drained on a paper towel and soaked in fresh resin for 4 hr with a change of fresh resin mixture every 1 hr. The tissues were again drained and transferred to fresh resin in silicon rubber moulds which were kept at 65°C for 48 hr. Sections of 50–60 nm thickness were cut with 'Reichert Jung Ultracut', collected in saturated uranyl acetate for 3 min and transferred to 5% lead citrate for 3 min, washed, dried and observed under a Philips 201C electron microscope.



Figures 1 and 2. 1. Healthy and phyllody-affected pigeonpea plants. **2.** Ultrathin section of leaf tissue of phyllody affected pigeonpea showing mycoplasma-like bodies in sieve tubes.

The present studies revealed the presence of mycoplasma-like bodies (60 to 300 nm) (figure 2) in sieve tubes of phloem tissues. Similar mycoplasma-like bodies were observed in many phyllody affected plants[4–7]. Besides this, application of tetracycline antibiotics to the diseased plants led to the suppression of symptoms in the present study with pigeonpea phyllody. Hence causative agent of pigeonpea phyllody is confirmed as MLO.

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A NEW POTENTIAL SOURCE OF CITRAL: AN IMPROVED CLONE OF CYMBOPOGON PENDULUS

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CITRAL—a monoterpene, forms a significant raw material for confectionery and beverages as it imparts a natural lemon-note to these products. It is also a potential source of β–ionone used for the synthesis of vitamin A and a number of chemicals including ionones required for synthetic voilet perfumes[1,2].

The traditional source of citral is the lemongrass oil obtained from *Cymbopogon flexuosus*, and to a lesser degree from *C. citratus*. Apart from these two species, there occur some other citral-bearing species, like *C. pendulus, C. khasianus* etc[3]. However, they have not been adequately exploited at commercial scale mainly due to the low citral content present in their oils.

To offset this disadvantage, an improved clone (No. 29) of *C. pendulus* was evolved through appropriate genetic manipulation. A few plants of *C. pendulus* were observed in the open-pollinated seed progenies of var OD.19 (obviously mixed seeds obtained from LRS, Odakkali, Kerala). Then, following repeated clonal selection in these progenies over time and space, the clone 29 was finally found to be most promising. A brief account of its general performance in relation to the two superior clones/varieties of *C. flexuosus* tested over different years is presented in this note.

On commercial steam distillation, the clone 29 (*C. pendulus*) excelled even the best clone, CIMAP/LS-48 (recently released) of *C. flexuosus* for oil yield giving 227 l/ha against 199 l/ha by the latter (table 1). Further, contrasted with OD.19 (an established variety of lemongrass from Lemongrass Research Station, Odakkali, Kerala) with 138 l/ha oil, it yielded, on an average, 64% more oil in the large pilot scale trials at two sites (Lucknow and Pantnagar *tarai* area).

With regard to citral content, the oil of the clone 29 contained 82% citral against 87% of those from CIMAP/LS-48 and OD.19. Accordingly, it yielded 186 kg/ha citral as compared to 120 kg/ha by OD.19 and 173 kg/ha by LS-48 (table 1). Thus, the clone 29 was the highest oil and citral yielder under both the conditions.

Table 1 *Oil and citral yield in different trials over years involving clone 29 against superior clones of lemongrass*

Clone/ variety	Initial trial oil (g/hill)	Advance trial		Pilot scale trial		
		Oil (g/hill)	Citral (g/hill)	Oil* (kg/ha)	Citral (%)	Citral (kg/ha)
Clone 29	4.2 (135)	7.3 (168)	5.9 (154)	227 (164)	82	186 (155)
LS.48	–	–	–	199 (144)	87	173 (144)
OD.19	3.1 (100)	4.3 (100)	3 8 (100)	138 (100)	87	120 (100)

* Average of four harvests over two locations; values in parentheses represent relative ranks