Thallus corticolous, whitish or cream coloured, smooth, K-, C-, KC-, P-, hypothallus indistinct. Stroma 4-6-carpous, 1.0–1.5 mm in diameter, completely embedded in thallus or emerging in the form of slightly convex thalline verruca; ascocarps radially arranged, horizontally placed, 0.4–0.5 mm in diameter, pyriform to slightly elongate due to lateral pressure from adjacent ascocarps, completely embedded within the thallus or in the thalline verruca, or upper part covered with thalline corticiform layer or becoming altogether naked and black in colour, each opening by means of a lateral ostiolar canal into the common, centrally situated black ostiole; excipuloid tissue black and carbonaceous; nucleus I+ wine red, without oil globules; paraphyses simple; asci 8-spored, cylindrical to narrowly clavate, apex annalasceous type, 55–60 × 8–11 μm; spores uni- or generally irregularly biseriate in ascus, hyaline, 3-septate (4-celled), ovate, cells cylindrical, 10–13 × 4–5 μm.

Remarks: Out of the hitherto known three species of this genus, only one, *L. paraguayense* Müll Arg is corticolous, in which stroma is 2-4-carpous and spores are larger, measuring 17–20 × 6–8.5 μm (Müll Arg, 1888). In *L. cubanum* Müll Arg, a limestone growing species, every ascocarp of a stroma (numbering 2–6) opens to the exterior by its independent ostiole (Müll Arg, 1885), instead of opening through a common ostiole. In *L. violascens* Malme, a calcicolous species, the stroma is 0.6–0.8(–1.0) mm in diameter and is bicarpous, rarely 1-3-carpous (Malme 1924).

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APHID VECTORS OF POTYVIRUS ISOLATES INFECTING GROUNDNUT AROUND TIRUPATI

A. SAILAJA, R. A. NAIDU,
P. SREENIVASULU and M. V. NAYUDU
Department of Botany, S.V. University,
Tirupati 517 502, India.

VIRAL diseases of groundnut in India have been recently reviewed[1]. Among them peanut mottle (PMV) and peanut green mosaic (PGMV) viruses were reported as members of potyvirus group. Three virus isolates, collected from the farmers' groundnut fields around Tirupati, were identified as members of potyvirus group based on particle morphology, inclusions and serology[2]. Serologically these isolates reacted with PGMV and peanut stripe virus (PStV) but not with PMV antisera. The aphid vectors of these three groundnut virus isolates are reported here.

The virus isolates were established in insect-proof wire mesh house by grafting and single lesion isolation techniques, and subsequently maintained by frequent sap inoculation on *Arachis hypogaea* cv TMV-2. They were tentatively marked as non-systemic (NS), systemic necrosis (SN) and systemic mosaic (SM) isolates based on the symptoms incited by them on *Phaseolus vulgaris* cv local. In the sap-inoculated groundnut plants, they incited systemic chlorotic spots and vein chlorosis in the young leaves 10–12 days after inoculation. Symptoms that subsequently developed varied with the isolate: with NS-mosaic, large dark green and light green areas, leaf size and plant height apparently normal; with SM-mosaic, whitish areas over normal green colour, the size of the leaves and whole plant reduced; with SN-vein clearing, oak leafline pattern besides green stripes along the veins, stunted plants with small leaves.

Groundnut (cv TMV-2), raised in earthen pots 15 cm dia containing garden soil, at 2–3 leaf stage were used as test plants. Fully expanded groundnut leaves showing severe symptoms were chosen as the virus source for the aphids. Naturally occurring adults of *Aphis craccivora* from groundnut and cowpea, *A. gossypii* from brinjal, *Myzus persicae* from tobacco and *Toxoptera odinae* from *Aralia* sp were used as vectors of virus isolates. Some of the aphids of each type were directly fed on healthy test plants to check that they were not carrying other viruses. The aphids were given 1 hr pre-acquisition starvation in glass test tubes, and allowed to acquire the virus on virus source leaves for 5 min. The viruliferous aphids (10/test plant) were transferred to terminal unfolding leaves of test plants and were given a test feeding period of 24 hr. After 24 hr, aphids were killed by spraying with ROGOR insecticide. The plants were observed for infection and the suspected plants were checked by sap inoculation on groundnut and French bean.

Potyviruses with characteristic particle morphology induce diagnostic inclusions and are usually transmitted by aphids in non-persistant manner[3]. PMV and PGMV, reported from India as members of potyvirus group, are transmitted by aphids in non-persistant

Table 1 *Aphid transmission of groundnut potyvirus isolates*

Name of aphids	SN isolate		SM isolate	
	No. of plants infected / No. of plants exposed	Per cent transmission	No. of plants infected / No. of plants exposed	Per cent transmission
Aphis craccivora (from cowpea)	7/60	11.6	5/40	12.5
A. gossypii	33/60	51.6	22/60	36.6
M. persicae	26/60	43.3	14/60	23.3
T. odinae	7/60	11.6	7/60	11.6

manner[4,5]. Short acquisition feeding period is a characteristic feature of non-persistent viruses[6]. *A. craccivora* from groundnut failed to transmit the 3 virus isolates, and the remaining aphids transmitted only SN and SM isolates but not NS isolate. The percent transmission of SN and SM isolates varied with aphids (table 1), decreasing with *A. gossypii*, *M. persicae*, *A. craccivora* and *T. odinae*. Thus SN and SM isolates can be considered as non-persistent viruses as they were acquired by aphids during 5 min feeding and transmitted them to the test plants without a latent period. None of these aphid vectors naturally infest groundnut crop. But still these non-colonizers can act as potential natural vectors of SN and SM isolates as alighting for short periods during their flights over groundnut crop may be sufficient for acquisition or inoculation of viruses. It would be worthwhile to examine the importance of the above four aphid vectors in the ecology of SN and SM virus isolates. Aphid transmissibility of SN and SM isolates supports their identification as potyviruses.

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RICHARDS FUNCTION—A FUNCTIONAL GROWTH ANALYSIS MODEL FOR RICE CULTIVARS (*ORYZA SATIVA* L.)

P. S. SRINIVASAN, K. MOHAN NAIDU and C. R. RANGANATHAN
Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore 641 003, India.

THE classical form of growth analysis has been combined by a second approach called functional growth analysis[1]. This has arisen partially from the limitations of classical growth analysis based on the assumptions made in the growth analysis. Radford[2] proposed the functional or dynamic approach in growth analysis especially for more frequent and smaller harvests (1 to 3 days) when the grouping of plants can be avoided. The data then used to describe accurately the relationships between weight and time which are usually fitted with approrpriate polynomial functions. The major advantage of this approach is that information for the whole period of interest is contained in two equations.