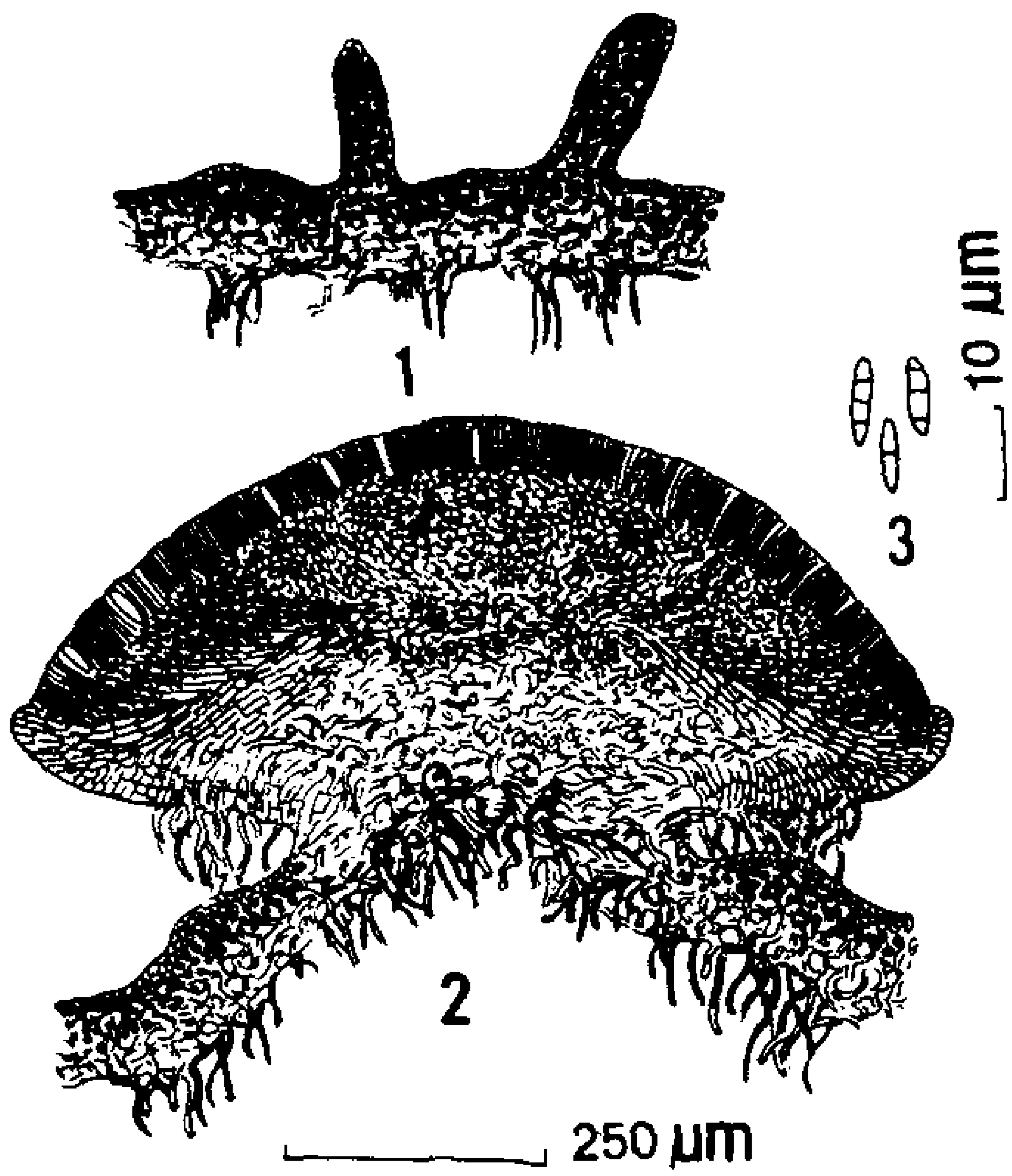

Figures 1-3. *Psorella isidiza* Patwardhan & Nagarkar. **1.** V.S. of the thallus. **2.** V.S. of the apothecium. **3.** Ascospores.

Thallus corticolous, greenish glaucous, effuse, minutely squamulose, isidiate; squamules about 1 mm long, 135-150 µm thick; isidia cylindrical, terete, simple, unbranched; apothecia adnate, constricted at the base, 0.7-1.0 mm in diameter; thalline margin deciduous; disc reddish brown, epruinose; epithecium K—; hypothecium yellowish brown; ascospores 8 per ascus, ellipsoid, tapering at the ends, one septate, 2-3 × 8-12 µm in size.

Chemistry: Thallus K—, P—, C—, KC—; TLC—.

Remarks: *P. isidiophora*[1] the only isidiate species in the genus *Psorella* has coralloid-branched isiidia and larger ascospores.

2. *Everniastrum neocirrhatum* (Hale & Wirth) Hale, Mycotaxon 3: 348, 1976. = *Parmelia neocirrhata* Hale & Wirth, Phyotologia 22: 37, 1971.

Specimen examined: Nagaland, Dimapur—Kohima Road, near Dhipimi—77.1458 (AMH).

Remarks: *E. neocirrhatum* differs from *E. cirrhatum* (Fr.) Hale in sparsely rhizinate thallus margin and in the presence of norstictic acid and salacinic acid in the medulla. Of the 21 species in the genus, only 4 *E. cirrhatum* (Fr.) Hale, *E. nepalense* (Tayl.) Hale, *E. sorocheilum* (Vain.) Hale and *E. vexans* (Zahlbr.) Hale, have so far been reported from Asia[2-4]. The occurrence of the present fifth species in Asia has phytogeographic significance of being America—Asia disjunct.

3. *Parmelina metarevoluta* (Asahina) Hale, Smithsonian Contrib. Bot., 33: 36, 1976. = *Parmelia metarevoluta* Asahina, Journ. Japanese Bot. 35: 97, 1960.

Specimens examined: Manipur, Kohima to Imphal road, near Mao—77.1568, 77. 1570, near Imphal—77.1636. Meghalaya, Shillong to Cherapunji road, Mowjrong—77.784 A. Sikkim, Gangatok, Tangshi View Point—77.1994.

Remarks: The present species is characterized by the marginal or submarginal pustulate soredia, yellow coloured medulla and presence of atranorine, galbinic acid and salacinic acid in the thallus. The specimens from the North East India have norstictic acid in addition to atranorine, galbinic acid and salacinic acid. The taxon is an addition to the lichens of India.

30 September, 1981.

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INFLUENCE OF PESTICIDE FORMULATIONS ON NITROGENASE ACTIVITY OF THE RICE RHIZOSPHERE SOIL

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Although a certain degree of disease and pest control is achieved by the application of pesticides, non-target organisms of particular interest, to the soil fertility are drastically affected by indiscriminate use of agrochemicals. The importance of nitrogen fixation in paddy soils has been well established[1-4]. Although extensive studies on the influence of several pesticides in pure cultures of nitrogen-fixing microorganisms have been conducted[5-10], very few data are available on their interaction with the soil nitrogenase[11,7,8]. Most investigations, so far, concentrated on the effect of pesticides on soil nitrogenase often in a plantless system. Moreover, information is particularly lacking on the influence of pesticides upon nitrogen fixation in the dynamic region of the rice rhizosphere. The

TABLE 1

Acetylene reduction in the rhizosphere soil as influenced by pesticide formulations from a submerged rice field

Treatment	*N_2-ase activity (nmoles C_2H_4/g soil/24 h) Days after transplantation			
	65	72	79	86
Control	142 ± 26†	322 ± 26	478 ± 28	452 ± 9
Hildan	39 ± 25	351 ± 10	238 ± 8	394 ± 12
Oftanol G	100 ± 10	433 ± 5	408 ± 96	491 ± 29
Oftanol EC	143 ± 5	356 ± 19	492 ± 29	534 ± 17
F.M.C. G	134 ± 7	462 ± 73	550 ± 5	507 ± 29
F.M.C. EC	198 ± 9	326 ± 25	764 ± 34	526 ± 33
Garvox G	132 ± 22	348 ± 13	420 ± 8	360 ± 9
Dursban EC	136 ± 5	364 ± 43	261 ± 5	537 ± 31
BPMC	154 ± 18	311 ± 4	555 ± 79	615 ± 25
Ekalux EC	170 ± 19	323 ± 25	524 ± 57	611 ± 25
Furadan	205 ± 16	416 ± 53	472 ± 21	557 ± 96
MIPC	210 ± 29	385 ± 67	532 ± 90	518 ± 76
Hilbeech	234 ± 25	252 ± 6	315 ± 11	516 ± 64
San-155	254 ± 22	209 ± 3	326 ± 41	516 ± 6
Mocap	300 ± 22	306 ± 33	642 ± 36	588 ± 22
Birlane EC	345 ± 24	292 ± 16	405 ± 3	657 ± 3

* 2-g rhizosphere soil sample collected on the respective days, were incubated in C_2H_2 for 24 h and analysed for C_2H_4 formation.

† Mean of three replicates from each plot ± standard deviation of the mean.

present study aims at evaluating the effect of certain promising and commonly used insecticide formulations, at recommended field application rates, on the rhizosphere soil nitrogenase activity from a field trial.

A field experiment was conducted to evaluate the relative efficiency of several promising and commercial insecticide formulations during the dry seasons at the Institute experimental farm. The granular formulations of insecticides (at 1-2 kg a.i./ha) were applied in the root zone area 30 and 50 days after transplanting the rice seedlings, while the EC formulations (at 0.5 kg a.i./ha) were sprayed with a hand compression sprayer on the plants 30, 40 and 60 days after transplanting. All treatments inculding control were replicated thrice. Three plants from each plot (nine plants per treatment) were carefully uprooted on 65, 72, 79 and 86th days after transplanting and the rhizosphere soil (2-g fresh weight) amended with 0.5% (w/w) glucose was transferred to vacutainer tubes (75 × 13 mm) for nitrogen fixation studies by acetylene (C_2H_2) reduction technique as described by Nayak *et al.*[12] Nitrogenase activity was expressed as nmoles of C_2H_4 formed/g dry soil/24 hr.

The peak rhizosphere nitrogenase activity was observed 4-5 weeks after transplantation coinciding with the maximum tillering of the plant and the activity started declining after 86 days. Interestingly, the influence of insecticides has become apparent during these periods although they were applied much before. Moreover, there seems to be a certain degree of consistency in relation to the stimulatory/inhibitory effects of several insecticides on nitrogen fixation (table 1). Thus, insecticides like FMC applied as either granules (G) or emulsifiable concentrate (EC) carbofuran, BPMC, MIPC exhibited stimulatory effect on the rhizosphere nitrogenase almost throughout the growing period of the rice plant. In contrast, endosulphan and bendiocarb inhibited the nitrogenase activity. Isofenphos, applied as granule or emulsifiable concentrate was not stimulatory to nitrogen fixation during the early periods while slight stimulation occurred as the plants grew older. Similar innocuous effects of insecticides were evident with the several other formulations. Admittedly, certain inconsistent effects were also not uncommon as evidenced with evisect, ethioprop and chlorbenvinphos on nitrogen fixation in the rhizosphere soil.

Consistent stimulatory or inhibitory influence of certain pesticides on nitrogen fixation has been reported particularly in studies under controlled laboratory conditions[11,7,8]. Also, in a field trial Nayak *et al.*[12] demonstrated the inhibitory effect of certain organophosphate insecticides. The inconsistent behaviour of certain insecticides with regard to rhizosphere nitrogenase activity is not clear. Perhaps physiological change in the rice plant during the growing period coupled with the wide fluctuations in the field eco-environment under natural conditions might be partly responsible. Moreover, the pattern of degradation of the parent molecule *viz.*, the appearance and disappearance of metabolites might contribute to the alteration in the effects on the rhizosphere nitrogenase activity.

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CYTOLOGY OF THE HYBRID PEPPER VARIETY, 'PANNIYUR-I'

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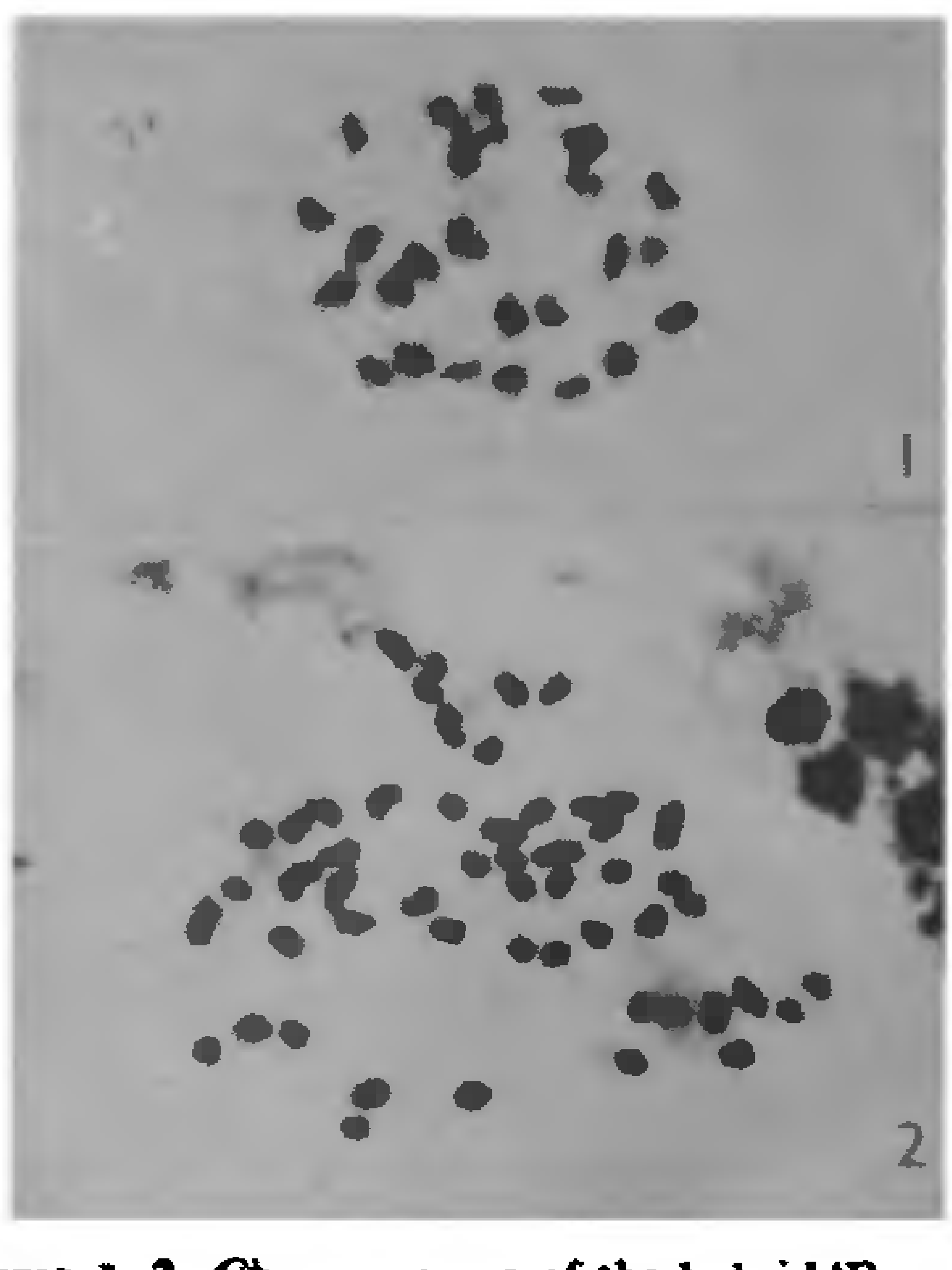
'PANNIYUR-I' is a high yielding hybrid variety of *Piper nigrum* L., evolved at the pepper research station at Panniyur (North Kerala) by crossing two local varieties, 'Uthiramkotta' (completely female vine) as the female parent and 'Cheriakaniakkadan' (bisexual) as the male parent. The desirable characters of the parent varieties are combined in the hybrid. Cytology of the hybrid is reported here.

Mitosis and meiosis were studied from root tips and PMCs respectively. Root tips and young spikes were fixed in 3:1 Carnoy's fluid, and chromosome preparations made by acetocarmine squash method[1]. The root tips were pretreated with 0.002 M solution of 8-hydroxyquinoline for 3 hr at 4° C.

Root tip cells showed 52 small-sized chromosomes (figure 2), and they could be grouped into three size classes such as 4 pairs of relatively long and rod-shaped (1.8–1.6μ), 10 medium-sized (1.3–1.1μ) and 12 of very small-sized (1.0–0.8μ) chromosomes. The parental varieties also showed $2n = 52$ chromosomes, and in karyotype features they were closely similar. Twenty six bivalents were observed in the PMCs of the hybrid (figure 1) as well as its male parent



Figures 1, 2. Chromosomes of the hybrid 'Panniyur-I'. **1.** A PMC at metaphase I, $n = 26 \times 1400$. **2.** Root tip mitosis, $2n = 52 \times 1400$.