leaf of the same age. Under severe infestation, the leaves turn completely black and ultimately wither away.

The population of psyllid nymphs in a single galled leaf was as high as 25–30, which includes all the stages of nymphal instars. The nymphs were covered with globular white waxy secretions which attracted ants. Most of these nymphs were sluggish lying inside these grooves. When the galls were disturbed the nymphs tended to come out of the gall. Adult psyllids of both sexes were also noticed inside the gall, but the population was as low as 2 to 5 in a leaf.

Psyllids are known to cause pouch galls[3], bud galls[4], leaf margin roll galls[5], leaf fold galls[6], and pit galls[1]. But the category discussed here exhibit an unique structure *viz* "leaf vein gall" which has not been noticed so far in psyllid cecidology.

In India, Mathur[2] reported five species under the genus *Arytaina* and all of them are free-living psyllids. The present observation throws light on the existence of a species of *Arytaina* under the sub-family Psyllinae as a gall-forming species from India.

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ANASTOMOSIS GROUPING OF ISOLATES OF *RHIZOCTONIA SOLANI* KÜHN (*THANATEPHORUS CUCUMERIS* (FRANK) DONK) CAUSING SHEATH BLIGHT OF RICE

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RHIZOCTONIA SOLANI Kühn (*Thanatephorus cucumeris* (Frank) Donk), a destructive plant pathogen is considered as a complex species[1]. Several workers have attempted to group *R. solani* according to various cultural, physiological and pathological criteria[2,3]. Such groupings were inconsistent due to its diversity in pathogenicity and character.

Capacity for hyphal anastomosis between different isolates of *R. solani* provided an indication of relationship between isolates; hyphal fusion occurring only between isolates of the same group. The first systematic grouping of *R. solani* based on anastomosis was done by Richter and Schneider[4]. Parmeter *et al*[5] grouped isolates of *R. solani* into four groups namely AG1, AG2, AG3 and AG4, on the basis of anastomosis. Abe and Tsuboki[6] assigned isolates of *R. solani* from potato into four anastomosis groups.

Attempts were made in this Institute to study the anastomosis between isolates of *R. solani* infecting rice and to compare the isolates with the AG tester cultures of Parmeter *et al*[5]. Fortyone isolates obtained from sheath blight infected rice plants and from other host plants were used in the study. The cultural and morphological characters were observed and the isolates grouped into morphological groups based on similarity of characters.

All isolates were inoculated on to rice plants (variety Jaya) and pathogenicity recorded. Similarly the rice isolate was inoculated on the different host plants for cross infection. The inoculum was grown on sterilized 2 to 3 cm bits of rice sheath in 250 ml conical flask.

Anastomosis between isolates were tested by the method adopted by Parmeter *et al*[5]. Opposing isolates were plated on cellophane resting on 2% water agar in 9 cm petri dish. One pair of isolate was tested per plate. The dishes were incubated at room temperature until the advancing hyphae made contact. Such portions of cellophane with the contacting hyphae were removed, stained with 0.1% cotton blue lactophenol and examined under the microscope for fusion.

Based on the cultural and morphological characters

Table 1 *Morphological grouping of fortyone isolates of Rhizoctonia solani Kühn. (Thanatephorus cucumeris (Frank) Donk)*

Morphological group	Host/Habitat	Source	Mycelial character on maturity	Sclerotial character on maturity
MG1	*Arachis hypogaea*	leaf	Mycelium subaerial, non-fluffy and appressed to substrate. Colour ranging from light brown to dark brown. Hyphal width ranging from 4 75 μm to 13.5 μm.	Sclerotia scattered irregularly but tending to concentrate towards the periphery to form clusters and bands. Sclerotium subglobose, surface regular and rough with and without honey dew formation. Colour dark brown and size ranging from 1.8 mm to 2.7 mm.
	Colocasia esculenta	petiole		
	Cymbopogen flexuosus	sheath		
	Cynodon dactylon	leaf		
	Monochoria vaginalis	leaf		
	Oryza sativa	sheath and		
	(17 isolates)	leaf		
	Panicum maximum	sheath		
	Pennisetum polystachyon	sheath		
	Sesbania aculeata	leaf		
	Sporobolus diander	leaf		
MG2	*Daucus carota*	tuber	Mycelium radiating, subaerial and scattered individually. White coloured and hyphal width ranging from 3.4 μm to 7.5 μm.	Abundant sclerotical formation concentrating towards the periphery of the culture and sides of plate. Sclerotium globose, surface regular and smooth. Size ranging from 1.5 mm to 1.9 mm and reddish brown to dark brown in colour.
	Lycopersicon esculentum	fruit		
	Marantha arundinacea	tuber		
	Musa paradisiaca	rhizome		
	Mushroom bed	paddy straw		
MG3	*Catharanthus roseus*	Collar region	Mycelium radiating, aerial, hyphae scattered and fluffy to thick aggregates towards the margin. White in colour and hyphal width ranging from 6μm to 10.2 μm.	Sclerotia distributed almost uniformly in plate. Sclerotium globose to irregular. Surface regular and smooth. Colour ranging from dark orange to brown.
	Phaseolus aureus	Collar region		
	Salvinia molesta	Leaf		
	Sesamum indicum	Collar region		
	Stylosanthes humilis	Collar region		
MG4	*Amorphophallus companulatus*	Leaf	Mycelium fluffy, cottony growth and white in colour. Hyphal width ranging from 4 μm to 6.5 μm.	Sclerotial formation not abundant and distributed irregularly in clumps. Sclerotium globose to oblong, surface irregular and smooth. Colour yellowish brown to brown. Size ranging from 1.9 mm to 2.0 mm.
		Collar region		
	Arachis hypogaea	Collar region		
	Glycine max	Leaf		
	Piper betle	Collar region		
	Vigna unguiniculata			

the isolates were grouped into 4 morphological groups *viz*, MG1, MG2, MG3 and MG4 (table 1). The characters considered were colour of mycelium, sclerotial size and distribution and nature of growth of mycelium. All isolates of MG1, which included the isolates of rice, could infect rice and produce typical symptoms of sheath blight. None of the MG2, MG3 and MG4 isolates infected rice. Rice isolate could infect all the hosts of the other MG1 isolates.

Anastomosis pairing showed that all isolates of rice anastomosed among themselves and with the other isolates of MG1 (figure 1) but could not anastomose with isolates of MG2, MG3 and MG4. Isolates of rice anastomosed with the AG1 tester isolate.

The results indicated that rice isolates and isolates of other host, infecting rice, come under the same anastomosis group corresponding to the AG1 of Parmeter *et al*[5].

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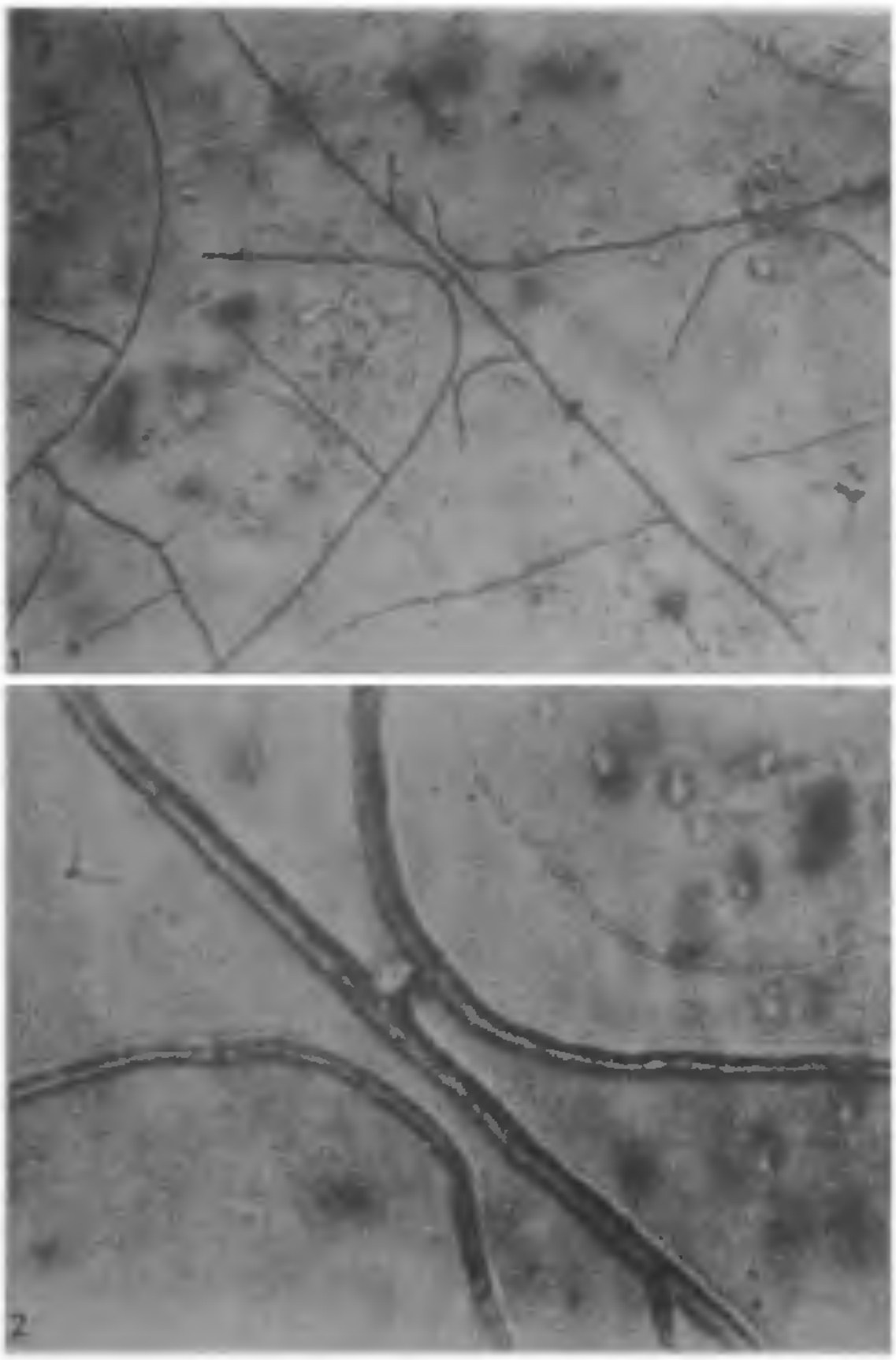

Figures 1, 2. 1. Anastomosis between two isolates of rice showing perfect fusion (× 100), **2.** Enlarged portion of the fused region (× 400).

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EFFECT OF MORPHACTIN ON SEED GERMINATION AND SEEDLING GROWTH OF TEA (*CAMELLIA SINENSIS* L.)

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MORPHACTIN (Chlorflurenol methyl ester) induced 100% germination at 100–250 μg/ml concentrations and exhibited supra-optimal effect at higher concentrations. It inhibited seedling growth resulting in a fleshy tap root with upwardly growing hook-like curvature at the root apex indicating its general apogeotropic action. The tap root produced abundant root hairs from the region of maturation.

Flurenol (9-hydroxy-9-flurenocarboxylate) is commonly referred to as morphactin. Morphactin should be considered not as a competitive 'anti-regulator' but rather as a 'polyvalent disturbing substance' acting in a way essentially detrimental to organization and correlation. On the other hand, morphactins possess a high degree of physiological tolerance compared to other synthetic active substances and are only temporarily active[1]. Morphactins, a versatile class of bioregulants, exhibit a wide range of diverse influence on plant growth and development[2].

Biclonal tea seeds were collected from the seed bari (orchard) located in New Area of Tocklai Experimental Station (Tea Research Association). Only sinkers were selected for experimentation. Seeds were surface-sterilized with 0.1% mercuric chloride before planting in sterilized sandfill earthenware pots. Seeds were soaked for 24 hr in respective concentrations of morphactin (0, 10, 50, 100, 250, 500 and 1000 μg/ml) before planting. Each treatment was repeated thrice, and for each repeat 25 seeds were used. Sands were kept moist by sprinkling with distilled water until the termination of the experiment. Germination percentage and seedling growth (root and shoot growth) were recorded after 14, 16 and 18th day of planting and subjected to statistical analysis.

Morphactin at the concentrations of 100 and 250 μg/ml induced 100% germination ($P < 0.01$). The next two higher concentrations 500 and 1000 μg/ml were supra-optimal (figure 1). Morphactin at 1000 μg/ml induced 90% germination against 76% at the control. Thus, even at the highest concentration 14% more germination was achieved.

Inhibition of germination due to morphactin treat-