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FUNGI ASSOCIATED WITH THE ROOTS OF HERBACEOUS PLANTS

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MOST of the herbaceous plants are known to possess vesicular-arbuscular mycorrhiza in roots with few exceptions[1]. Roots sometimes also have some structures belonging to parasitic fungi like *Polymyxa*, *Ligniera* and *Olpidium* etc[2-6]. The present investigation is a part of the survey on VAM being conducted in this laboratory. During these studies we have found some other fungi associated with the roots in addition to VAM which is described here. The present note is one the fungi associated with the roots of *Sorghum bicolor* (PC-9) and *Eclipta alba*.

The plants of jowar, *S. bicolor* var PC-9 were raised in the departmental beds whereas *E.* alba was growing as a common weed. The root samples were collected at regular intervals and washed with water to separate the soil and the water thus collected was wet-sieved and decanted for counting VAM fungal spores. The washed roots were then cleared and stained[7], and subsequently examined.

The stained roots of jowar showed the presence of zoosporangia or cysts intercellularly or intracellularly during the vegetative growth of jowar (figure 1 B,C). The cysts were of various shapes and sizes often forming elongated chains in the root cortex. These cysts were brown to brownish black in colour. The fungus attained coiled and looped configurations within the root matrix. These cysts were identified to be those of *Olpidium brassicae*. Prior to flowering the roots were heavily colonized by indigenous VAM

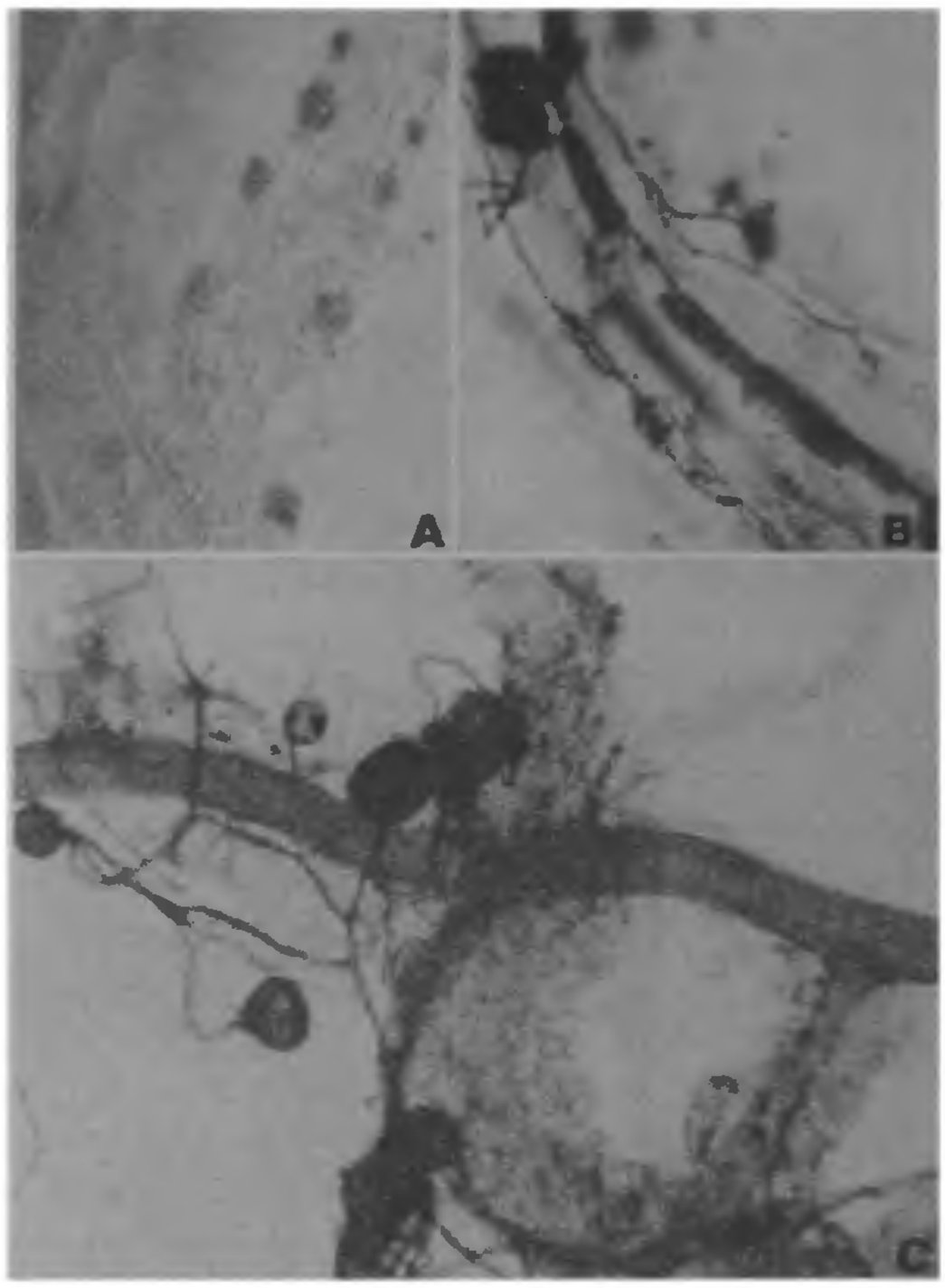

Figure 1. **A.** An infected root of *Eclipta alba* showing cysts of *Olpidium brassicae*. **B.** Cysts in elongated chains in root matrix. **C.** Germinating spores of Glomus *fasciculatum* on the root of *Sorghum bicolor*.

fungi viz *Glomus fasciculatum* and *Glomus fuegianum*. In plants with established VAM association, it was observed that the incidence of *Olpidium brassicae* declined considerably. However in *E. alba*, the cysts of *O. brassicae* were formed abundantly in root cortex at all the stages of growth along with VAM association.

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A NEW RECORD OF WEEWIL GALL ON *AMMANIA ROTALA* CL (LYTHRACEAE)

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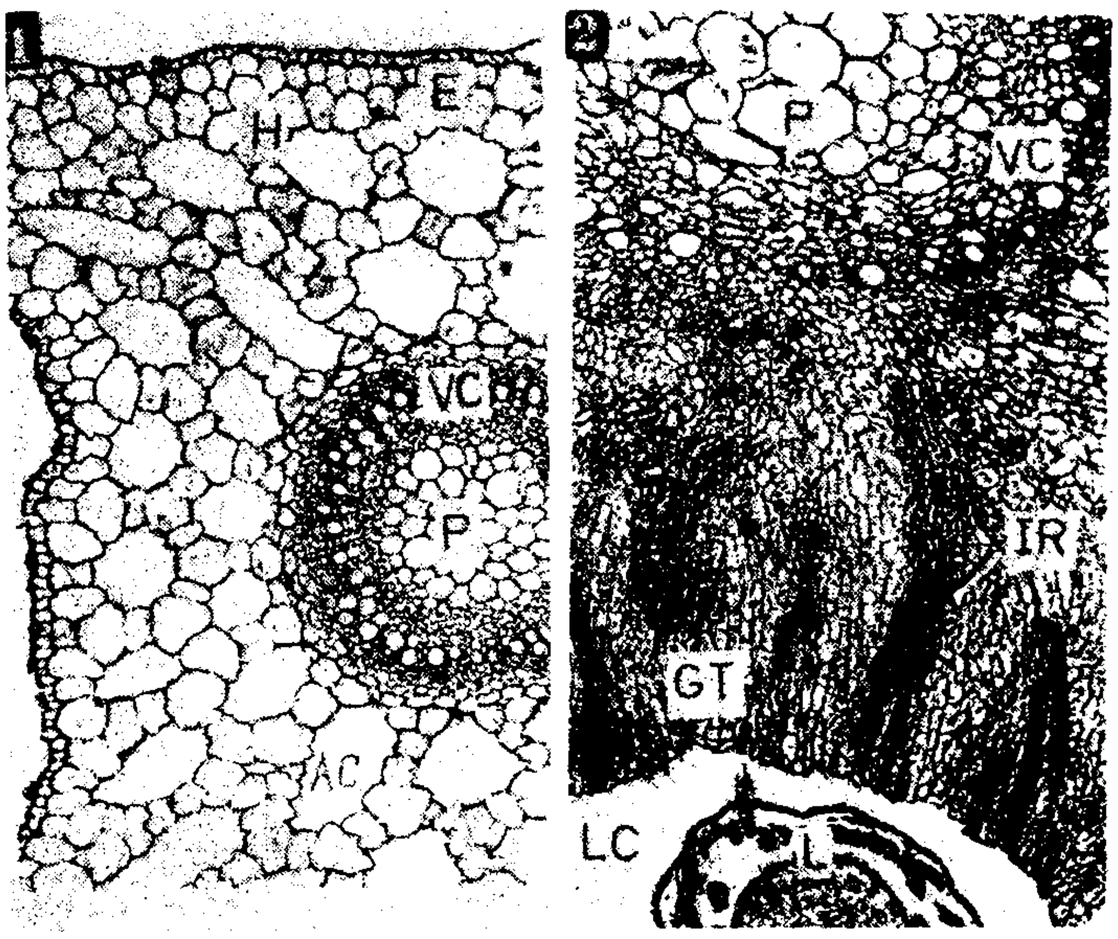
A STEM gall is found to be of frequent occurrence of *Ammania rotala* CL which is recorded for the first time. The causal agent was reared and identified as a Weewil (Curculionidae—Coleoptera). The gall occurs both on the nodal and internodal regions of the stem. It is either a unilateral bulging or a radially symmetrical spindle-shaped body. The mature gall is pale brown and solid. The larva enters into the stem at a very early stage of maturation of the stem tissues and it harbours in the cortex in the vicinity of the vascular cylinder. As the larva feeds on the cortical tissue, it is induced to proliferate indiscriminately suppressing the differentiation of the air chambers and the aerenchyma (figures 1, 2). The hypodermal layers also undergo limited proliferation and subsequent enlargement of the cells. All these hyperplastic and hypertrophic events lead to the formation of a hemispherical bulging constituting the gall. The free counterpart of the stem remains normal on the opposite side and it retains the original organization. The gall consists of small, densely cytoplasmic tissue with prominent nuclei and rich inclusions. This is bounded externally by highly hypertrophied compact cells of the cortex. The larva occurs inside the wide larval chamber which is situated in the centre of the gall. The larval chamber is surrounded by disintegrated cells resulting from the feeding activity of the larva (figure 2).

The essential aspect of the gall pertains to the fate of the cambium in the gall. In the unaffected part of the stem, the vascular cambium and its derivative xylem and phloem remain normal. In the gall portion, the cambial initials have been converted into parenchyma and the latter has merged with the stream of the gall tissues losing the cambial identity. The vascular tissues formed prior to cecidogenesis have been thrown into



Figures 1–2. 1. T.S. of a normal stem showing the aerenchymatous cortex and central vascular cylinder; **2.** T.S. of the gall portion (A.C.–air chambers; E.–epidermis; G.T.–gall tissues; H.–hypodermis; I.R.–irrigating strands; L.–larva; L.C.–larval chamber; P.–pith; V.C.–vascular cylinder).

narrow scattered strands throughout the gall tissues (figure 2). These strands consist mostly of phloem and a few xylem elements and they are all directed towards the larval cavity. The occurrence of such vascular strands in the gall tissue has been observed in several foliar and stem galls[1]. These strands are designated as 'irrigating strands' in the sense that they conduct nutrition to the developing larva in the larval chamber[2]. The parenchymatization of the cambial initials is presumably due to the influence of deprival of the growth hormones necessary for the functioning of the cambium. As the larva matures into adult insect, the Weevil escapes by making circular hole in the gall.

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