

Figure 1 Conidium and mycelium of *C. verruciformis* Agarwal & Sahni ($\times 1000$)

was proved by artificial inoculation of healthy plants with the spore suspension. The culture had been identified as *Curvularia verruciformis* Agarwal and Sahni (IMI No-269261).

Literature study showed that this fungus was first reported from India¹ in wheat. Subsequently, Roy *et al.*² reported that this fungus infected the rice grain in the N. E. Region. Therefore, this is the first report that the ring spot and blight disease of Lemongrass is caused by *C. verruciformis* Agarwal and Sahni. Further investigation on host-parasite relationship is in progress.

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APHYLLOPHORALES OF KUMAUN HILLS-III

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EARLIER, workers¹⁻³ have reported some Aphyllophoraceous fungi from Kumaun region. This paper is in continuation of our exhaustive study of wood-

decaying fungi of Kumaun region^{4,5}. In this note three more wood-decaying fungi, viz., *Amyloporia crassa* var. *subimbricata* Dom., *Spongipellis borealis* (Fr.) Pat. and *Tyromyces caesius* (Sched. ex Fr.) Murr. have been described in detail. The fungi were isolated by tissue culture method on tea agar medium⁶ and the cultural characters have been described according to Nobles⁷ pattern. The collection has been deposited in the Herbarium, Botany Department, Kumaun University, Naini Tal.

1. *Amyloporia crassa* var. *subimbricata* Dom., Grzyby, 92-95, 1965. (figures 1,2 and figures 7-14).

Fruit body perennial, corky when fresh, rigid on drying, pileus effused, becoming tuberculate, somewhat globose or irregular in shape, dirty white to creamish; subiculum up to 10 mm thick, and if on a rough surface, the mycelium penetrating the surface forms a pseudosubiculum which seems to be added by a filling of the old tube layers, corky, homogenous; hymenophore poroid, white when fresh, slightly darkening with age, pores circular to oval, rarely angular, 5-7 per mm, dissepiments thin and entire, tubes 1-1.5 mm long; hyphal system dimitic, generative hyphae hyaline, thin-walled, sparingly branched, septate 2.5-4 μ m broad; skeletal hyphae hyaline, thick-walled, 4-6.5 μ m broad; basidia hyaline, clavate, 12-17 \times 4-5.5 μ m, 2-4 sterigmate; basidiospores hyaline, smooth, thin-walled, emyloid, ellipsoid to narrow-ellipsoid, 5-7 \times 2-3.5 μ m; cystidia hyaline, sharp-pointed, paraphysis-like or hyphal in nature, 15-24 \times 3.5-7.5 μ m.

Key pattern: 2,1,2,1,9,2,2,2,2,2,2.

Growth characters: Growth moderately rapid, plate covered in 2-3 weeks, advancing zone even, hyaline appressed; mat white, appressed, soft and cottony; no fruiting; reverse unchanged; odour none; no diffusion zone. Advancing zone: hyphae hyaline, thin-walled, branched, septate, clamped, 3-4 μ m broad. Aerial mycelium: (a) hyphae as in the advancing zone but rarely clamped, (b) fibre hyphae hyaline, thick-walled, aseptate, unbranched, not clamped, 5.5-6.5 μ m broad. Submerged mycelium: (a) hyphae as in the advancing zone, (b) tetrahedral crystals present.

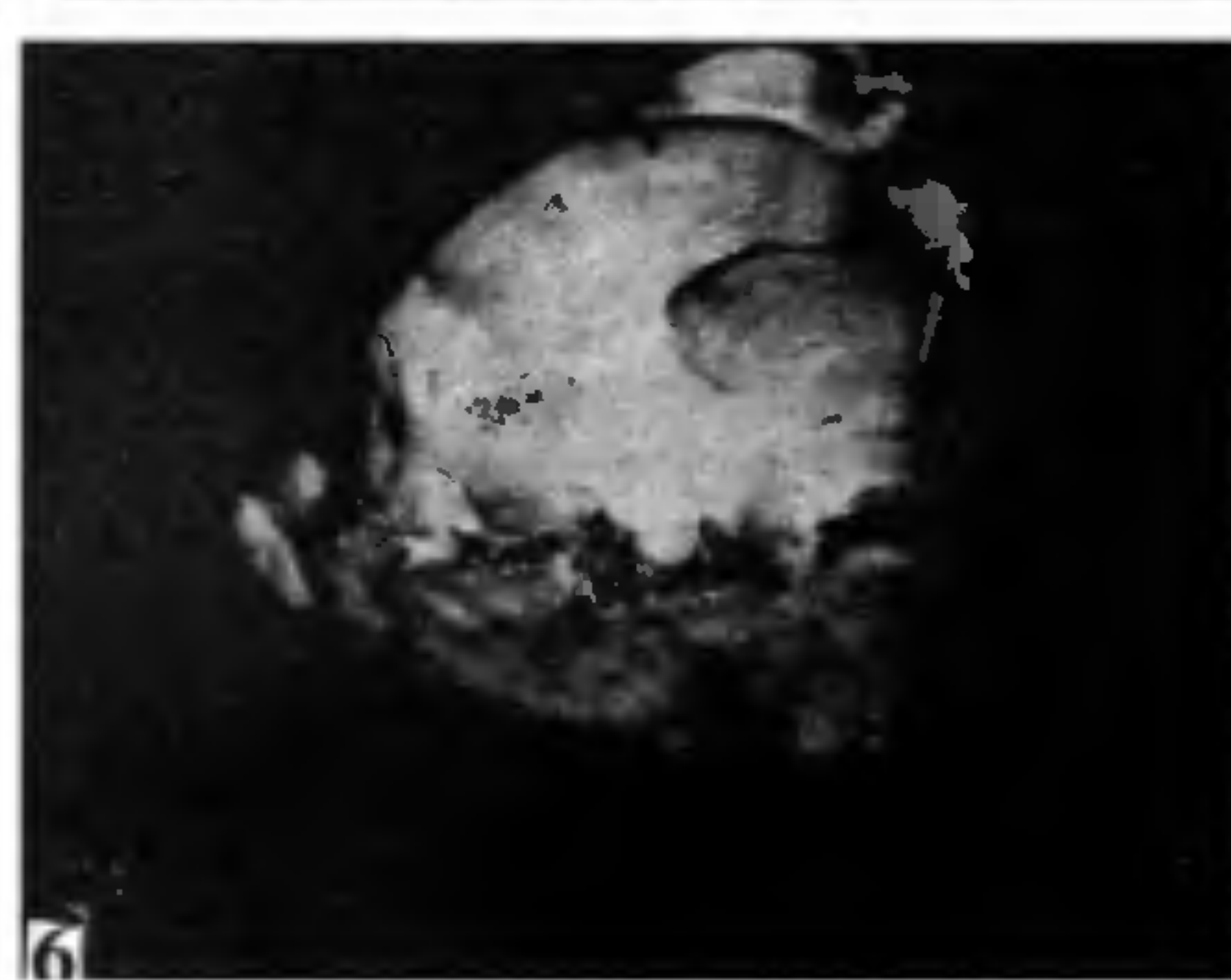
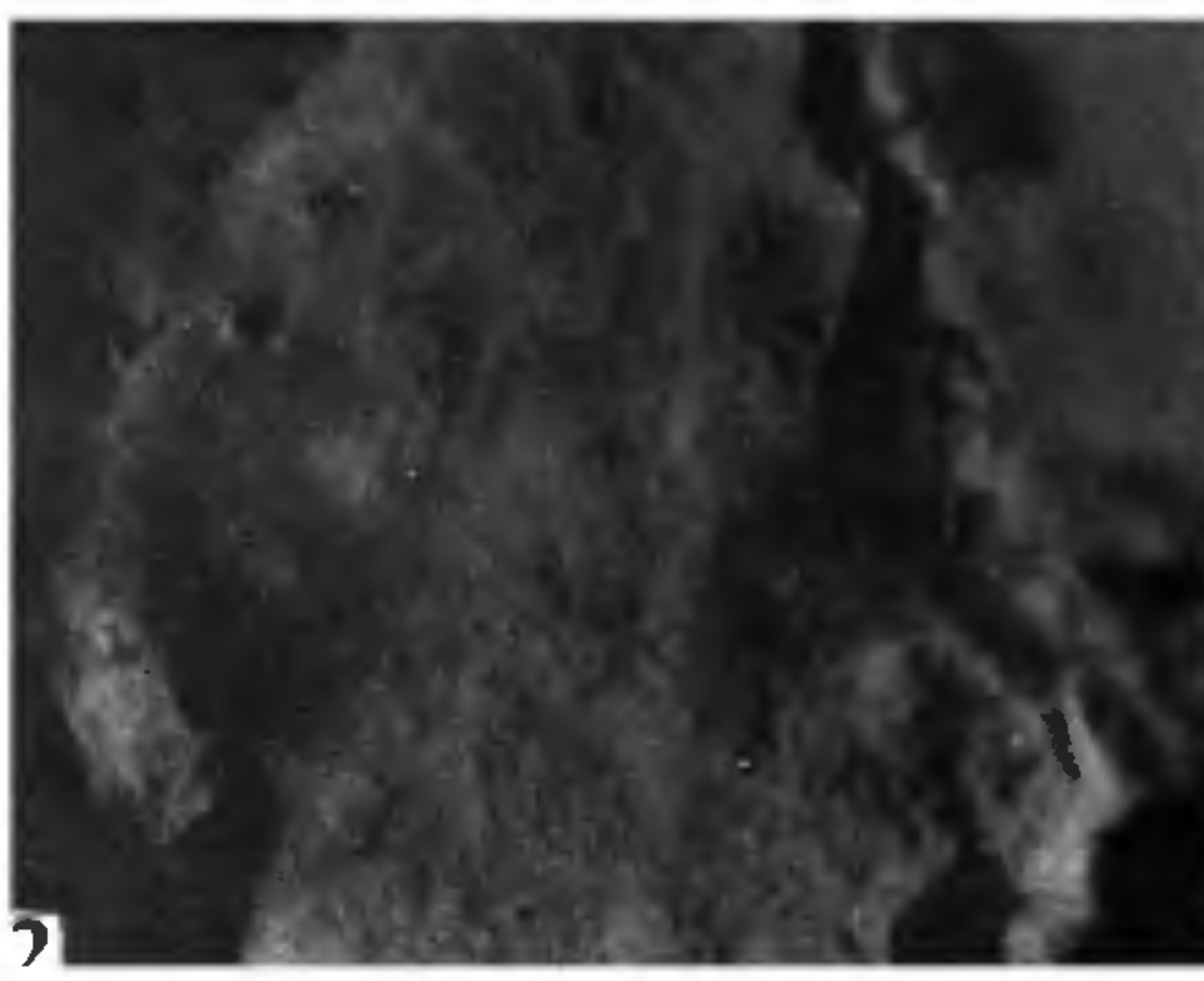
Habit and habitat: On a fallen log of *Pinus roxburghii* Sarg., Kasar Devi, Almora, N 16, 6 December 1978, Snow View, Naini Tal, N 514, 28 October 1981.

2. *Spongipellis borealis* (Fr.) Pat., Essai Tax. Hym. 1900. (figures 3-4 and figures 15-27)

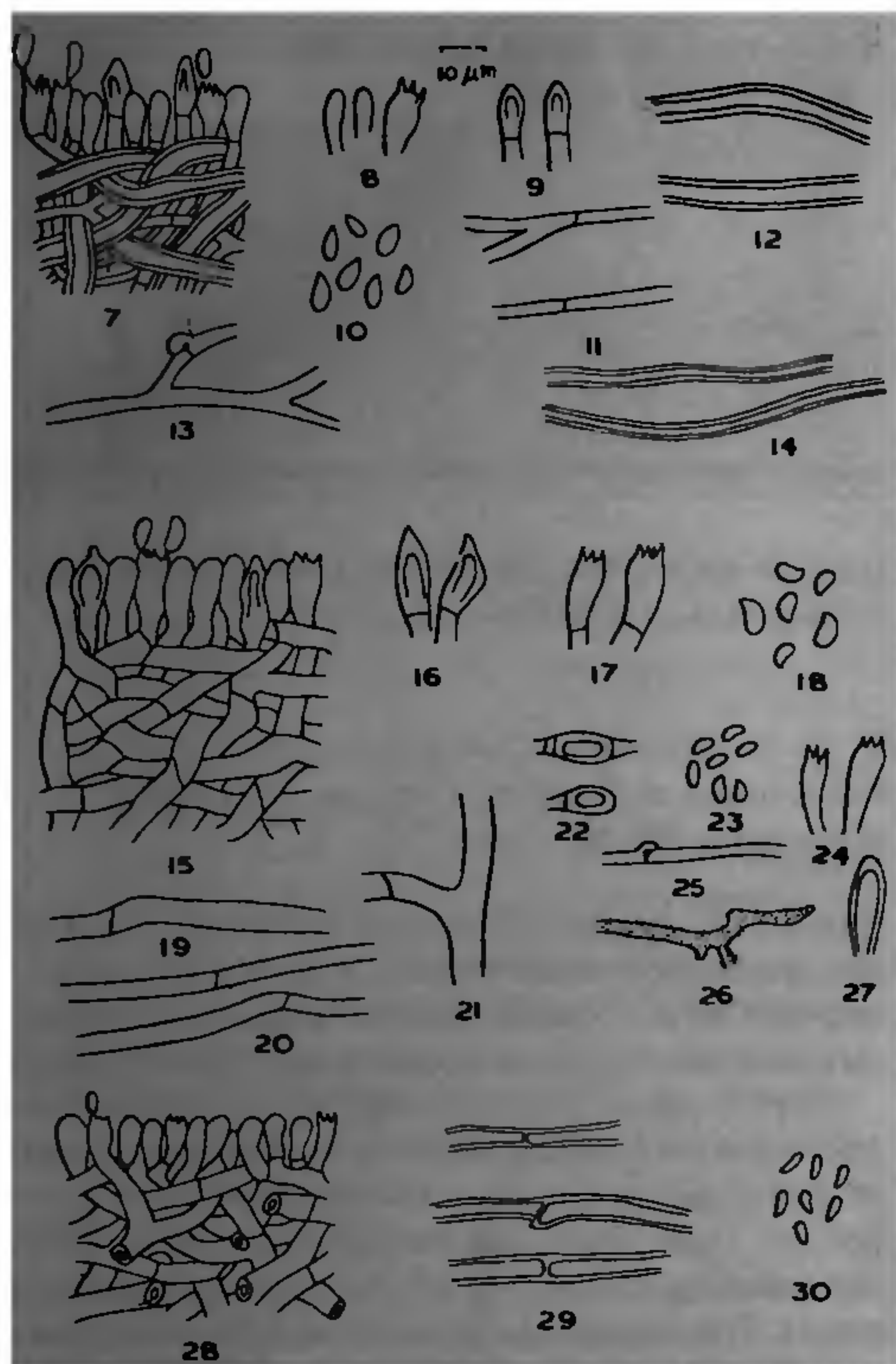
Fruit body annual, flabelliform to dimidiate; pileus substipitate, narrowed at the base, rarely sessile, watery-tough when fresh becoming fibrous-tough on drying 3.5-12 \times 3-10 \times 0.5-2 cm; upper surface white, sometimes yellowish or brownish, coarsely hispid to tomentose, becoming glabrous in herbarium, spongy

when fresh, azonate; margin thin, acute, fertile below, curving towards upper surface; context white to slightly yellow, usually duplex when fresh, coarsely fibrous towards upper surface, firm and fibrous near

the tubes, slightly zonate in dried specimens, 0.5–1.5 cm thick at the base: hyphal system monomitic, hyphae hyaline, rarely branched, thin-walled, often



Figures 1–6. *Amyloporia crassa* var. *subimbricata* 1. Fruit body $\times 1/2$. 2. Hymenophore $\times 2$. 3–4 *Spongipellis borealis*. 3. Fruit body, upper surface $\times 1$. 4. Fruit body, lower surface $\times 1$. 5–6 *Tyromyces caesius*. 5. Fruit body, upper surface $\times 1$. 6. Hymenophore $\times 1$.



Figures 7-30. 7-14. *Amyloporia crassa* var. *subimbricata* 7. V. S. through fruit body; 8. Basidia; 9. Cystidia; 10. Basidiospores; 11. Generative hyphae; 12. Skeletal hyphae; 13. Hyphae from advancing zone, and 14. Hyphae from aerial mycelium. 15-27 *Spongipellis borealis* 15. V. S. through fruit body; 16. Cystidia; 17. Basidia; 18. Basidiospores; 19-21. Generative hyphae; 22. Chlamydospores; 23. Basidiospores in culture; 24. Basidia in culture; 25. Hyphae from advancing zone; 26. Hyphae from aerial mycelium, and 27. Cystidia in culture. 28-30 *Tyromyces caesius* 28. V. S. through fruit body; 29. Generative hyphae, and 30. Basidiospores.

collapsing, 4-7.5 μm broad, without clamp connections, septate hymenophore poroid, tubes white when fresh, yellow or light yellowish-brown on drying, often collapsing on drying, 3-12 mm long; pores angular to daedaloid, irregular, concolorous to the tubes, 1-3 per mm; basidia hyaline, clavate, 5-7 μm broad, 4-sterigmate, sterigmata up to 3 μm long; basidiospores hyaline, smooth, thin-walled or thick-walled, ellipsoid to ovoid, 4-7 \times 3-4 μm ; cystidia hyaline, thin

to thick-walled, ventricose, usually embedded in the hymenium, rarely projecting up to 16 μm beyond the hymenium, 8-15 μm broad.

Key pattern: 2,1,1,1 (0,1), 1,2,2 (2,3), 1,2.

Growth characters: Growth moderately rapid, plate covered in 4-6 weeks. Advancing zone even, scant aerial mycelium extending to the limit of growth; mat white, ferruginous in the beginning, then felty to pellicular with more or less conspicuous lines of slightly raised compact mycelium; fruiting bodies appearing at the edge of petri-dish after 4-6 weeks; reverse unchanged; odour none; diffusion zone weak on tannic acid agar, no growth. Advancing zone: hyphae hyaline, thin-walled, nodose-septate, 2.5-4.5 μm broad. Aerial mycelium: (a) hyphae similar to the advancing zone, (b) contorted hyphae numerous, irregularly branched, incrusted, 4.5-6.5 μm broad, (c) chlamydospores abundant, hyaline, thick-walled, intercalary to terminal, 12.5-20 \times 6.7-17.5 μm . Fruit body: (a) basidia hyaline, clavate, 4.5-7 μm broad, 4-sterigmate, (b) basidiospores hyaline, avoid, 4.5-7 \times 3.5-4.5 μm , (c) cystidia abundant, hyaline, ventricose, 22-35 \times 6.5-7.5 μm . Submerged mycelium: (a) hyphae as in the advancing zone, (b) chlamydospores similar as present in the aerial mycelium. **Habit and habitat:** Collected on pine stump, Patwanger, Naini Tal, N 462, 22, September 1981.

3. *Tyromyces caesius* (Schrad. ex Fr.) Murr., North Amer. Fl. 9:34. 1907. (figures 5-6 and figures 28-30).

Fruit body annual, sessile or effuso-reflexed, soft and fleshy or at least spongy when fresh, becoming hard and rigid on drying, imbricate; pileus thin and applanate, white or grey, often bluish-grey or staining blue, drying grey to yellowish, 1-5 \times 1-4 (7.5) \times 0.2-1 cm; upper surface villose, pubescent or strigose-pubescent at the base and villose on the margin; margin thin and entire; hymenophore poroid, hymenial surface white, cineraceous or greyish-blue, often turning light bluish on bruising (especially near the margin); pores angular to irregular, 2-4 per mm; pore tubes 2.5-8 mm long, dissepiments thin, even or torn; context white homogenous, 0.1-1 cm thick; hyphal system monomitic, hyphae with thick and non-staining walls, narrow lumen present, septate, clamped, 4.5-8 μm broad; basidia hyaline, clavate, 4.5-5.5 μm broad; basidiospores hyaline, pale aspen blue in mass, cylindrical or allantoid, smooth, 3-5 \times 0.7-1.5 μm ; hyphal pegs abundant usually with adhering spores. **Habit and habitat:** Collected on the bark of *Melia azedarach* Linn., Naini Tal, N 484, 31, July 1981.

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POTENTIAL BIOLOGICAL CONTROL OF *PARTHENIUM HYSTEROPHORUS* L.

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RECENTLY a weedy species of *Cassia* L. has been reported from many parts of Maharashtra and Karnataka. It was first reported¹ as a new species from Pune, which neither had a specific name nor any Latin diagnosis and therefore, was invalid. However, it was first collected by Singh² in August 1976 from Bijapur district of Karnataka State, who reported it as a new record for India based on the confirmation of Dr H. C. D de' Wit. Raghavan³ once again reported it based on the above said Gurav's collection, confirmed by Dr. R. M. Polhill.

A native of Tropical America, *Cassia uniflora* Mill. (*C. sericea* Sw.) has weedy tendencies even in its native habitat and as also indicated by Singh² for India. On further continued observations at Pune, it has been noticed that it started occupying larger areas, especially along the roadsides, and has been penetrating the areas traditionally occupied earlier by *Parthenium hysterophorus*. Therefore, the replacement of *P. hysterophorus* by *C. uniflora* is a welcome stage, which sometimes is total but limited to a narrow strip along the roads. As it is a leguminous plant, it may enrich the soil by nitrogen fixation. It sets seed profusely which can easily be collected and used.

P. hysterophorus attracts the attention of a majority of workers especially those of weed controllers, but so far no satisfactory results have emerged. Therefore, *C. uniflora* may be used to biologically control *P. hysterophorus*.

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REGENERATION FROM GLUME CALLI OF HEXAPLOID TRITICALE

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TRITICALE, an amphidiploid of wheat and rye, is the first man-made cereal which is superior in total protein and lysine content, besides other useful characters, like hardness and disease resistance over wheat.

Plant breeders have been utilising the conventional and mutation breeding methods for the improvement of the triticales over the past several years but with little success. Plant tissue culture techniques complement the breeding methods in genetic engineering of crop plants. The successful utilisation of different explants at various developmental stages, for callus initiation and rapid plant regeneration is a prerequisite for such an approach. Tissue culture studies with triticales are mostly confined to immature embryos¹ and anthers². Our earlier studies have suggested that among different seedling explants, shoot base was more efficient for callus initiation and plantlet regeneration³. The present investigation mainly deals with the use of glumes, at three developmental stages for successful callus initiation and plantlet regeneration.

Boots of hexaploid triticales strain DTS 330 were collected from the main tillers of field grown plants at different ages of five, ten and fifteen days after panicle initiation. The boots were sterilised with 0.1% mercuric chloride for about fifteen minutes followed by thorough washing with sterile distilled water under sterile transferhood. Glumes from sterilised boots were taken and transferred onto Linsmaier and Skoog's media⁴ (LS) with 2 mg/l, 2,4-dichlorophenoxy acetic acid (2,4-D) for callus initiation. After five weeks, glumes giving rise to callus were recorded. The calli were later subjected to regeneration. Four types of media were used for regeneration; LS basal media; LS media with 0.5 mg/l Kinetin (KN) plus 0.1 mg/l naphthalene acetic acid (NAA); and LS media