on *Azospirillum* at the levels used. The method of treatment is mainly responsible for the reduction in the number of cells on the seeds. A reduction in the number of cells initially carried on the seeds might be one of the reasons for the reduced population of the inoculated *Azospirillum* in the rhizosphere region during early stages of the crop. However, in the case of captan, the adverse effect was alleviated within four weeks whereas with thiram, the effect persisted even after four weeks. The adverse effect of tetramethyl thiuram disulphids (TMTD) on *Azotobacter* was observed by Klincare[3] who had reported that wheat seed treatment with 50% TMTD ten days before bacterization delayed the development of *Azotobacter* in the rhizosphere.

The fungicides may also indirectly influence the subsequent establishment of *Azospirillum* in the rhizosphere by creating favourable or unfavourable conditions for the organism. Nayak and Rao[4] observed stimulation of N_2 fixation in soils by benomyl treatment (5 μg/g of soil) and concluded that the stimulation might be due to provision of a more favourable redox level. Bashan[5] enhanced wheat root colonization by *A. brasilense* by using substances inhibiting fungi and bacteria and not *A. brasilense*.

Increased populations of *Azospirillum* recorded in the rhizosphere of seeds treated with captan prior to *Azospirillum* treatment might be due to favourable shift in the ecological balance of the soil for *Azospirillum* or the chemical might have been utilized as energy source by the organism resulting in an increase[6].

These results indicate that the seed dressing fungicides like captan and thiram can be safely used at recommended doses (4 g/kg of seed) as a pretreatment prior to seed bacterization.

19 March 1988; Revised 12 May 1988

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COLCHICINE-INDUCED AMPHIDIPLOID OF *ATYLOSIA ALBICANS* × *ATYLOSIA CAJANIFOLIA*

KALPANA SRIVASTAVA and S. N. TRIPATHI
Division of Plant Improvement, Indian Grassland and Fodder Research Institute, Jhansi 284 003, India.

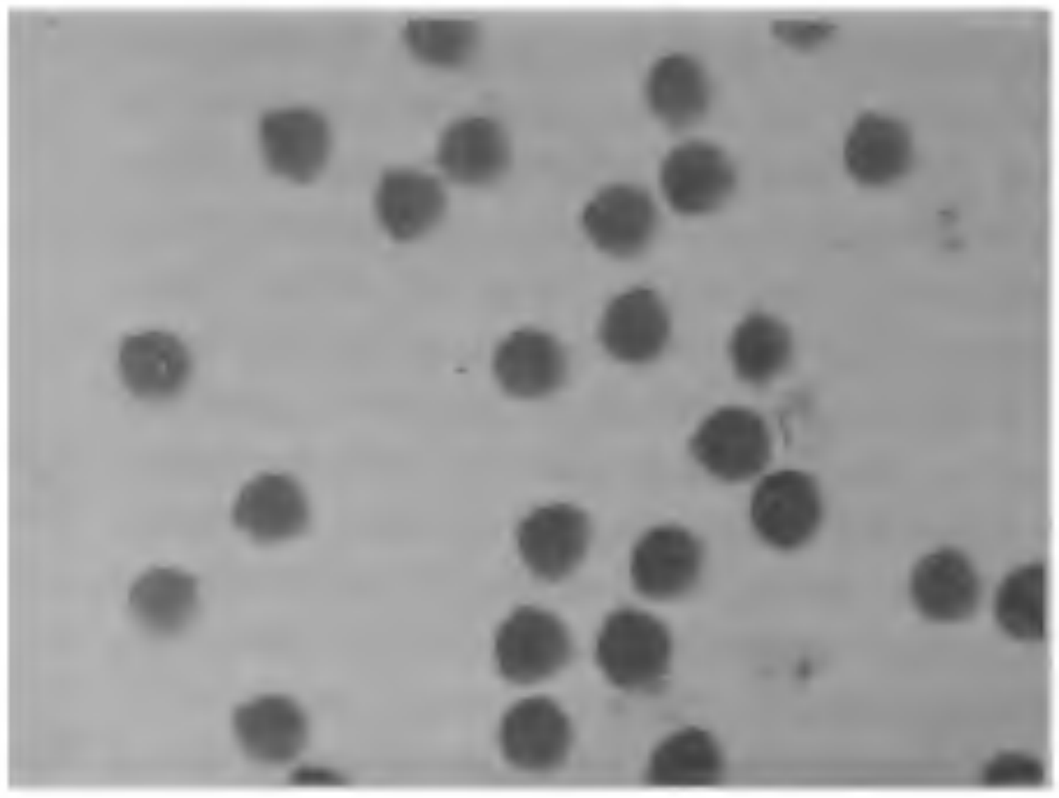
Atylosia albicans ($2n = 22$) and *Atylosia cajanifolia* ($2n = 22$) are the wild relatives of *Cajanus cajan* and possess high seed protein content[1]. *A. cajanifolia* is a drought-tolerent species[2], has forage potentiality in range land situations. F_1 hybrid seeds were obtained when pollination was done using *A. albicans* as seed parent and *A. cajanifolia* as pollen parent[3].

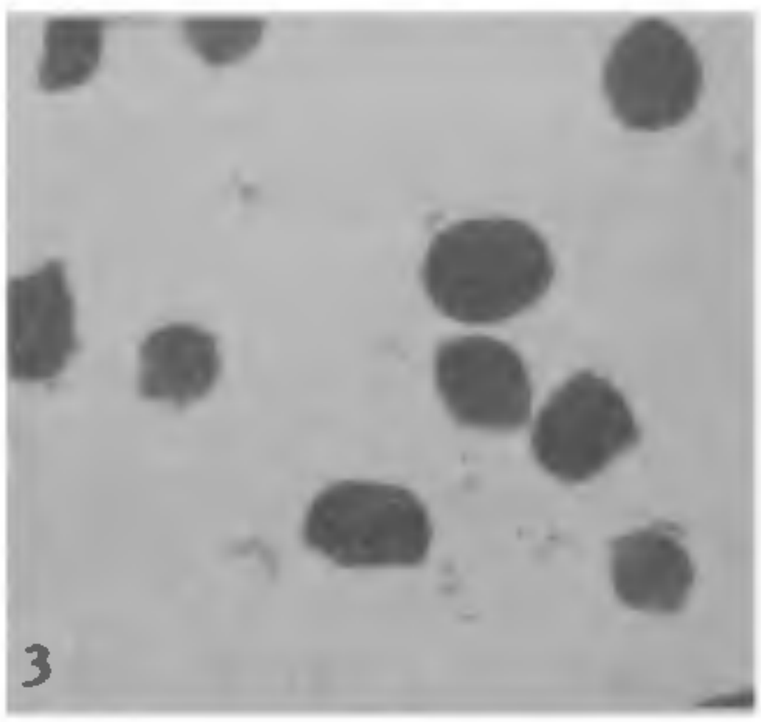
Seedlings of (*A. albicans* × *A. cajanifolia*) hybrid were treated with colchicine for inducing amphidiploidy. Forty-four somatic chromosomes were counted at metaphase (figure 6). The amphidiploid plant showed delayed flowering as compared to the diploid F_1 hybrid. Increase in the size of leaflets (figure 1), pollen (figures 2 and 3), stomata, flower and seed were noticed in the amphidiploid in comparison to F_1 hybrid plant. Dark green colour of leaves, reduction in pod size and pod set per cent were observed in the amphidiploid plant.

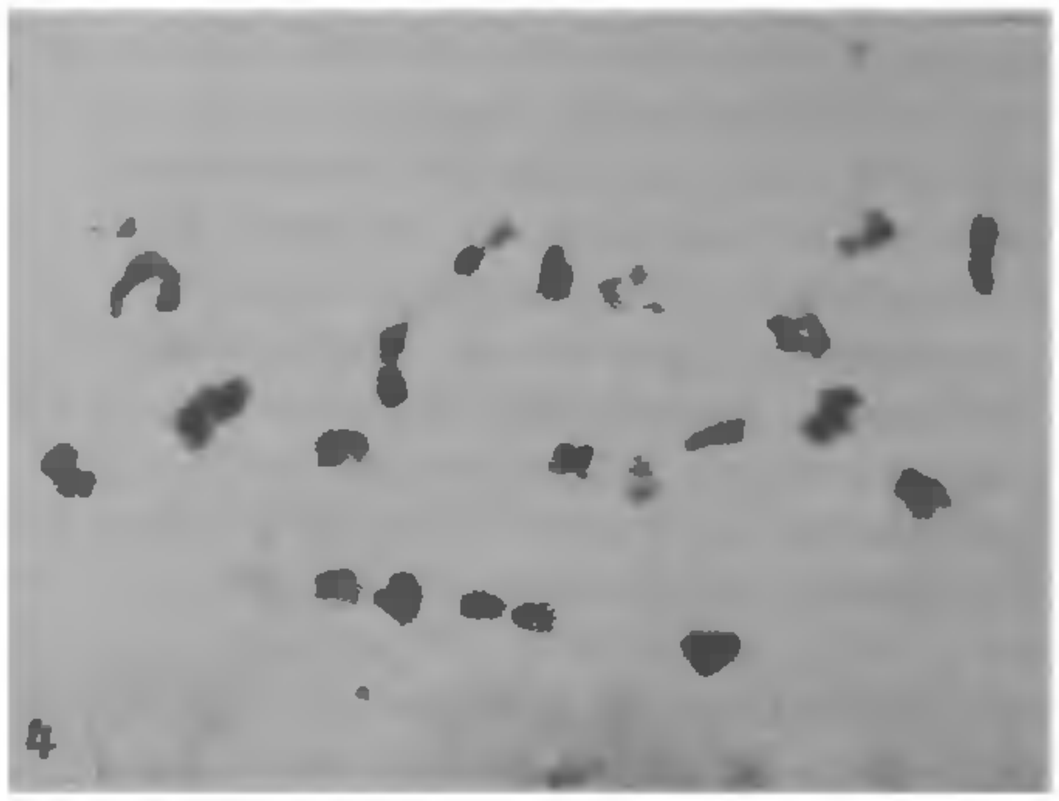
Meiosis in amphidiploid revealed $2n = 4x = 44$ chromosomes at MI. Twenty-two bivalents (figure 4) were recorded in 52% of the cells. Chromosome associations of 21 II's + 2 I's; 1 IV + 18 II's + 4 I's (figure 5) and 20 II's + 4 I's were recorded in 34, 8 and 6 per cent of the cells respectively. At anaphase-I, no meiotic irregularity was seen except in a few cells where lagging chromosomes were noticed, which resulted in the formation of micronuclei at sporad stage. Increased pollen fertility percentage (93.6) was noticed in the amphidiploid in contrast to 64 of the F_1 hybrid. Inspite of good pollen fertility, the seed setting was much lower in amphidiploid plant, as compared to F_1 hybrid.

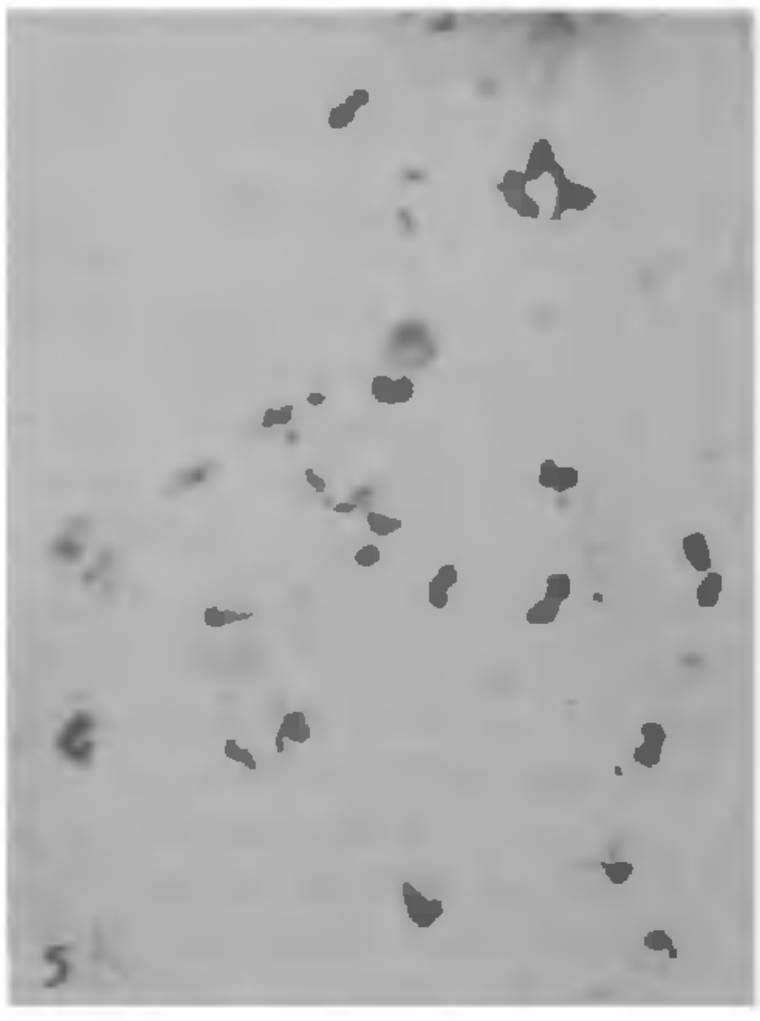
In the present study, a majority of PMCs showed bivalents. Amphidiploid with higher bivalent frequency is reported[4] in the cross between *Phaseolus aureus* and *P. mungo*. The frequency of quadrivalent in the present amphidiploid was very low. Lower quadrivalent frequency has indicated that some kind of genetic mechanism evolved along with polyploidy to suppress multivalent formation to a considerable extent. The formation of univalents could be due to existence of some structural differences in the parental genomes.

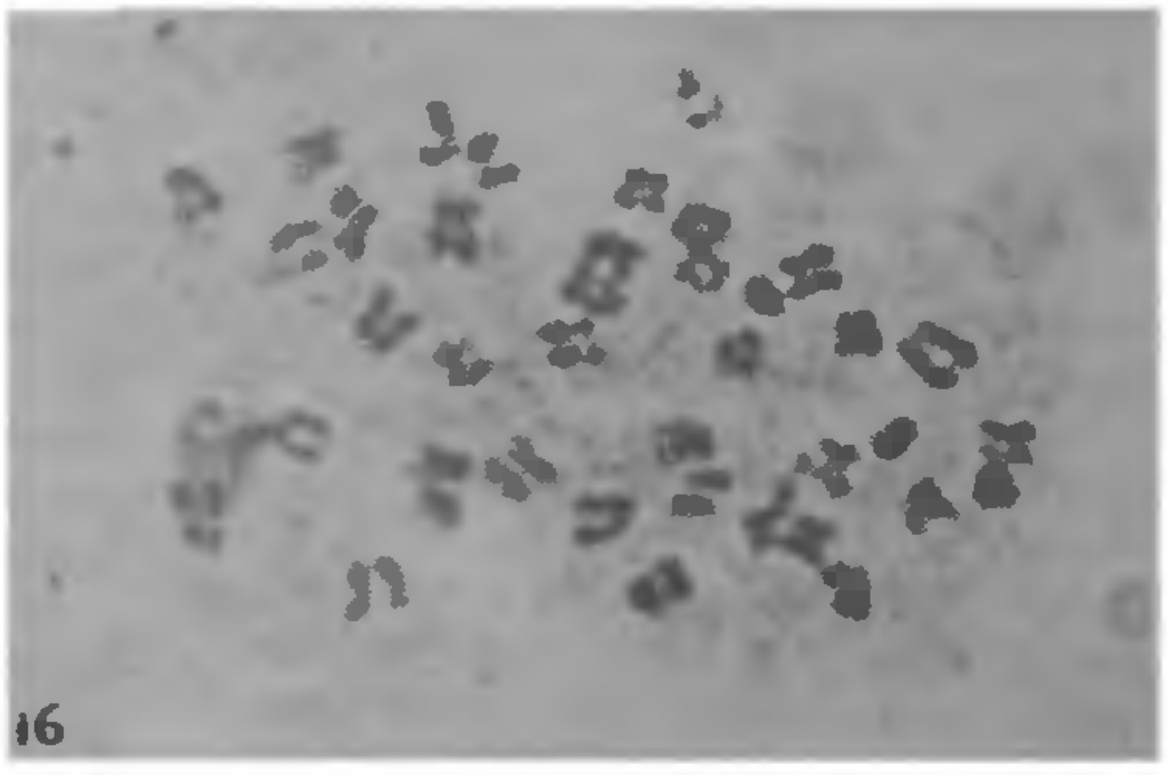
As far as induced amphiploidy in *A. albicans* × *A. cajanifolia* is concerned, it has however not shown











Figures 1–6. 1. Leaves of diploid F_1 hybrid and the amphidiploid plant (L to R). **2.** Pollen grains of diploid F_1 hybrid; **3.** Pollen grains of amphidiploid plant; **4.** 22 bivalents at meiotic M–I (amiphidiploid); **5.** IIV + 18 IIs + 4 Is at meiotic M-I of (amphidiploid), and **6.** 44 chromosomes at somatic metaphase of (amphidiploid).

much promising result in the present investigation for its economic exploitation except for increased leafiness which is an important characteristic from the forage point of view. Thus hope lies in the selection of new plant types through onward generations of progenies for rangeland forage production.

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A NEW RECORD OF EDIBLE *RUSSULA* FROM INDIA

R. P. BHATT* and T. N. LAKHANPAL
Department of Biosciences, Himachal Pradesh University, Summer-Hill, Shimla 171 005, India.
** Present address: Department of Botany, Garhwal University Campus, Pauri, Garhwal 246 001, India.*

RUSSULA LUTEA (Huds. ex Fr.) Fr. an edible fungus is recorded for the first time from India[1]. The specimens have been deposited in the Herbarium, Department of Biosciences, Himachal Pradesh University, Shimla (HPUB) and with Dr M. Locquin, France.

Russula lutea (Huds. ex Fr.) Fr., Epicr. p. 363, 1838; *Hym. Eur.* p. 454, 1874; *Syll. Fung.* **5**: 480, 1887, figure 1A–G.

Pileus 4–7 cm diam., convex when young, becoming applanate at maturity, shallowly depressed in the centre; cuticle peeling easily, glabrous, viscid when wet, deep yellow to golden yellow[2]; margin decurved when young, becoming plane at maturity, slightly striated; flesh 0.4–0.8 cm thick at disc, firm, brittle, unchanging when cut or bruised. Taste mild. Odour pleasant. Lamellae adnexed or free, thin, close, usually equal in length, yellow to orange; edges entire. Stipe 3–5 cm long and 0.8–1.5 cm diam., central, cylindric, equal in diam. throughout or slightly tapering upward, dry, smooth, yellowish white, solid at first hollowing with age. Spore colour in mass ochraceous. Spores 8–10 × 7.5–9 μm, broadly ellipsoid to subglobose, amyloid; ornamentation 0.4–1 μm high, of moderately coarse warts, mostly separate or some confluent forming short ridges; apiculus up to 2 μm long. Basidia 24–52 × 8–13(–15) μm, clavate, tetrasporic; sterigmata 3–6.5 μm long. Pleurocystidia 50–88 × 6–11.5 μm, cylindric to subcylindric, clavate, fusoidclavate or fusiform with subacute to rounded apex; arising in the subhymenium or from the outer portion of trama; filled with hyaline refractive contents or partially empty; abundant. Cheilocystidia similar to pleurocystidia. Subhymenium 20–35 μm thick, pseudoparenchymatous. Hymenophoral trama consisting of hyaline, thin-walled, septate, branched, interwoven hyphae, 1.5–9 μm diam and sphaerocysts up to 48 × 42 μm. Pileus cuticle is made up of hyaline, thin-walled, septate, branched, interwoven, non-gelatinous hyphae, 1.5–5.5 μm diam. Pileus context heteromerous, consisting of hyaline, thin-walled, septate, branched, interwoven hyphae, 2–5.5(–10) μm diam and sphaerocysts up

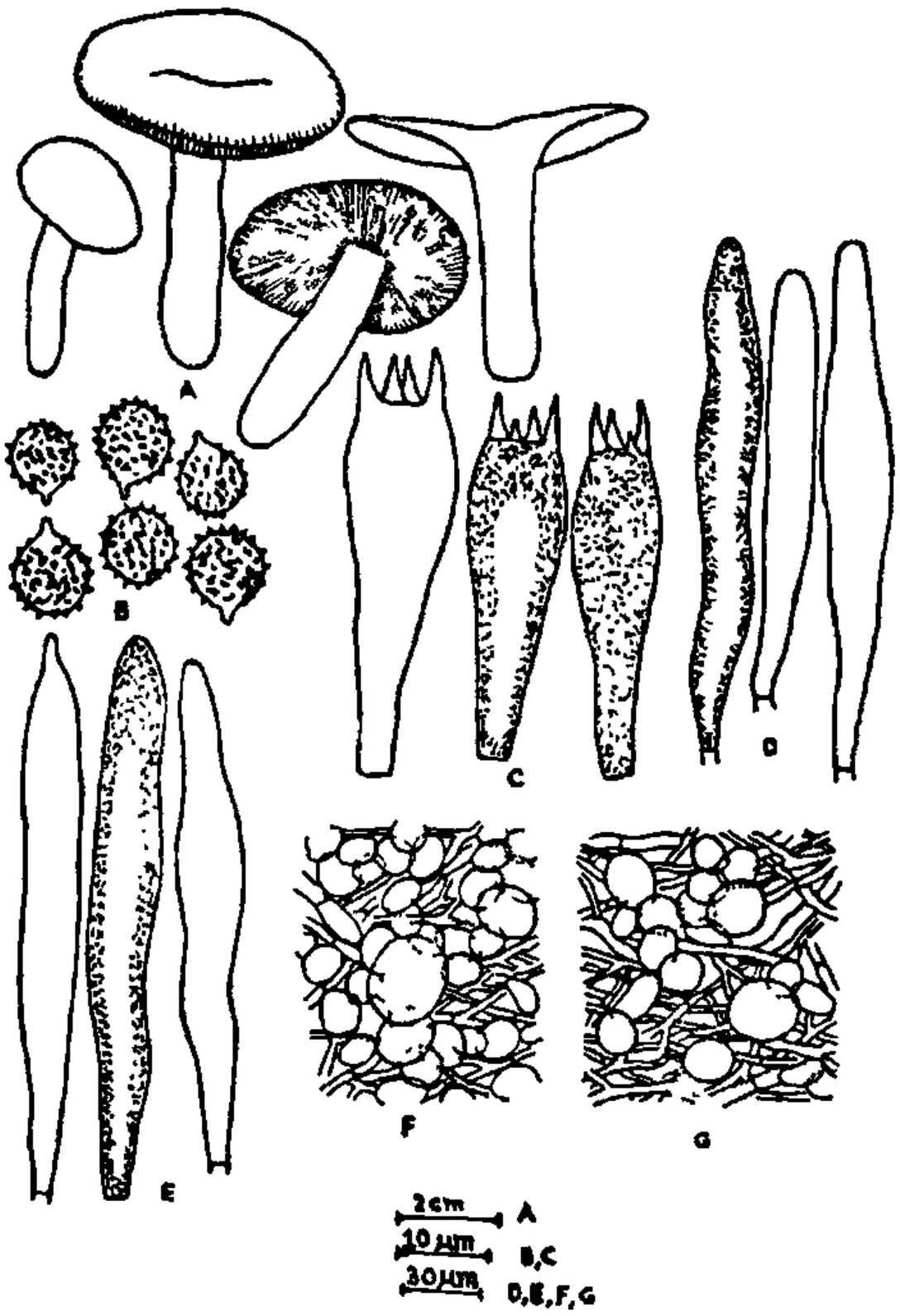

Figure 1A–G. *Russula lutea* (Huds. ex Fr.) Fr. **A.** Basidiocarps with longitudinal section; **B.** Basidiospores; **C.** Basidia; **D.** Cheilocystidia; **E.** Pleurocystidia; **F.** Hymenophoral trama (part), and **G.** Pileus context (part).