PARTHENIUM HYSTEROPHORUS L—A SUBSTRATE FOR RAISING *PLEUROTUS SAJOR CAJU* MUSHROOM

T. K. DAS, M. K. SARMAH and R. SARMAH
Defence Research Laboratory, Post Bag No. 2, Tezpur 784001, India.

PLEUROTUS SAJOR CAJU Singer, a natural saprophyte on the stumps of Euphorbia royleana, has been successfully cultivated in India on a wide variety of substrates, which include paddy straw, banana pseudostems[1,2] etc.

In search of a readily available substrate without involving much cost *Parthenium hysterophorus* was tried to grow this edible mushroom. *P. hysterophorus* L appears to be a serious agricultural problem and is known to be capable of causing allergic dermatitis[3,4]. Several methods have been tried to eradicate this hazardous weed including mechanical methods advocated by IARI, New Delhi. There is hardly any report on economic utilization of this weed which is multiplying at an alarming rate. An attempt was therefore made to use the weed as substrate for raising mushroom.

Dry tender stems of *P. hysterophorus* were chopped (2.5 cm) and steeped in water for one hour. It is then taken out, excess of water drained off and calcium sulphate and calcium carbonate were added to it at the rate of 60 g and 20 g per kg dry weight of the substrates respectively. The whole mass was then given a moist heat treatment at 60°C for 10 min. When cooled it is spawned in 3 layers with the culture of *P. sajor caju* developed in wheat grain medium in a perforated aluminium container. Over each layer of spawning 10 g of gram dal powder was sprinkled. Temperature and humidity recorded during the study was 22.5°C and 78% respectively. Vegetative growth of mycelia or 'spawn run' was completed by 23 days of spawning and pin heads started appearing (figure 1). Total hervest from a 3 kg dry weight of the substrate was 420 g in three flushes.

The harvested mushrooms were dehydrated in a hot air drier and sent to the Industrial Toxicology Research Centre, Lucknow to ascertain its suitability for human consumption. This weed can be utilized for raising *Pleurotus* sp mushroom provided the mushroom raised on it is safe for consumption. Further studies are in progress.

14 August 1985

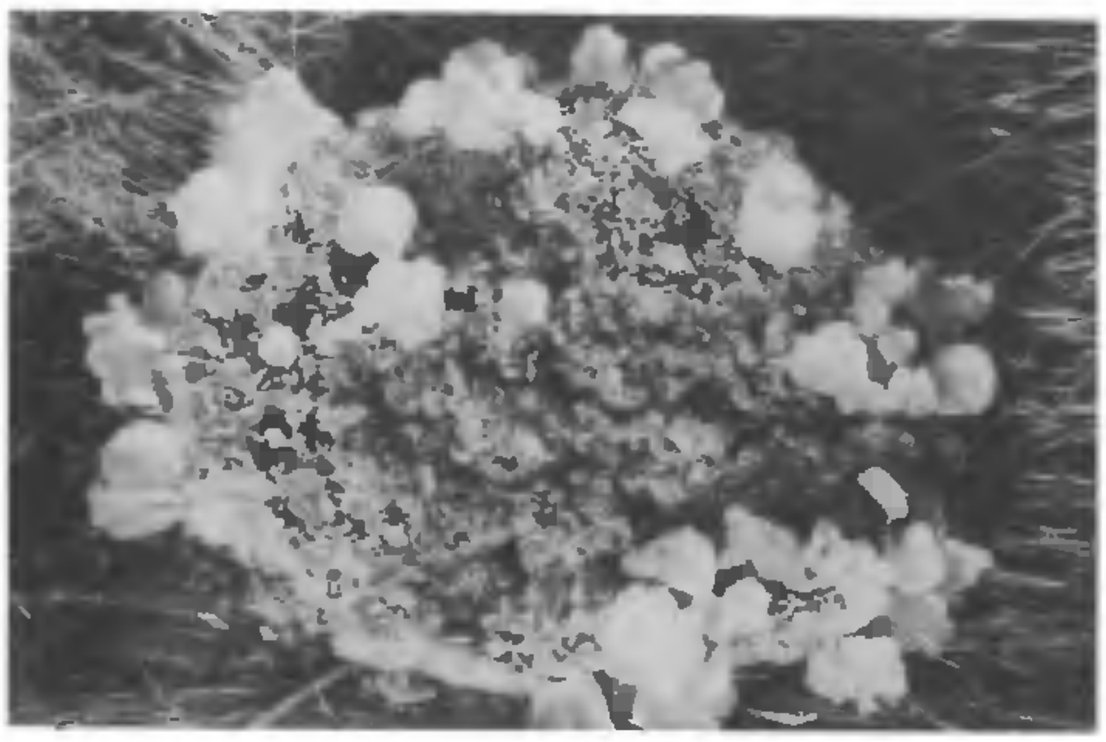

Figure 1. *Pleurotus sajor caju* mushroom grown on *Parthenium hystrophorus*.

1. Jandaik, C. L. and Kapoor, J. N., *Mushroom Sci.*, 1974, **9**, 667.
2. Rangaswami, G., Kandaswami, T. K. and Ramaswamy, K., *Curr. Sci.*, 1975, **44**, 403.
3. Lonkar, A., Mitchell, J. C. and Calnan, C. D., *Trans. St. Johns. Hosp. Derm. Soc.*, 1974, **60**, 43.
4. Lonkar, A., *Proc. Sem. Parthenium*, 1976, 14.

UTILIZATION OF THE DIAZOTROPH, *AZOSPIRILLUM* FOR INDUCING ROOTING IN PEPPER CUTTINGS (*PIPER NIGRUM* L)

M. GOVINDAN and K. C. CHANDY
Regional Agricultural Research Station, Pilicode 670353, India.

MANY of the tropical grasses, cereals, plantation crops and several weed plants have been reported to harbour *Azospirillum* in their root system in large numbers[1-3]. In addition to their nitrogen-fixing capacity, *A. brasilense* has been reported to produce plant growth promoting substances under *in vitro* conditions[4].

Black pepper, one of the most important spice crops of India, is a perennial crop which is vegetatively propagated through cuttings. In this communication we report the beneficial effect of *Azospirillum* inoculation in pepper.

Isolates of *Azospirillum* were obtained from the surface-sterilized root tissues of six-year-old pepper plants grown in the farm attached to this Research Station, employing the semisolid malate medium[5]. The isolate PIL 12, used for the present study was

Table 1 *Effect of Azospirillum on pepper cuttings, one month after treatment.*

Treatments	* Percentage of rooted cuttings	* Number of roots/ cutting	* Total length of roots/ cutting (cm)	* Dry weight of roots (g)	** Germinated cuttings (precent)	** Length of sprout/ cutting (cm)	** Number of fully opened leaves/cutting	* Dry weights of sprout/ cutting (mg)
Azospirillum (PIL 12)	80	7.4	34.5	0.05	80	5 7	3 1	133
IBA 1000 ppm	80	16.0	82.1	0.09	37.5	1.7	0 5	6
Control	0	0	0	0	40	2.2	1 3	17

* Data represent mean of 10 observations, ** Data represent mean of 40 observations.

found to be *Azospirillum lipoferum*[6]. The production of GA and IAA by this isolate under *in vitro* condition was confirmed using paper chromatography[7].

Cuttings of (25 cm length with two modes) one-year-old runner shoots of pepper cv Panniyur-1 were given two treatments namely, 72 hr old broth culture of *A. lipoferum* and 1000 ppm Indole 3-butyric acid (IBA) solution. Distilled water was used as the control. Treatments were given by dipping the lower-most portion of the cuttings (upto 2 cm) in the respective solutions. Cuttings were dipped in the bacterial broth for 2 min and in the IBA solution for 45 sec. The treated cuttings were planted in the pots filled with unsterile potting mixture (soil : sand : FYM :: 1 : 1 : 1).

Inoculation with *Azospirillum* was found to increase root formation, root development, root weight and germination of cuttings over uninoculated control (table 1). Uninoculated plants developed no root even after 30 days of planting as against the treated plants which were found to produce a mean number of 7.4 roots/cutting. *Azospirillum* inoculation has been reported to cause proliferation of root hairs and root elongation[8] in pearl millet. Dewan and Subba Rao[9] also reported increase in root biomass of rice seedlings as a result of inoculation with *Azospirillum*. These effects have been attributed to plant growth promoting substances produced by the bacteria. The positive responses observed in the present study due to the inoculation of *A. lipoferum* PIL 12 might be due to the production of phytohormones like GA and IAA by the bacteria, which has been confirmed by studies under *in vitro* conditions[4].

While the treatment with IBA[10] induced a greater number of roots (16/cutting) as compared to the *Azospirillum* inoculation (7.4/cutting), bacterial inoculation favoured the production of apparently more healthy and strong roots, a trait desirable for quick and better establishment of the plant. While the treatment with IBA increased only root development, *Azospirillum* promoted both root and shoot development. Though 80% of the plants treated with IBA developed roots, only 37.50% of them showed sprouting. On the other hand 80% of the plants treated with *Azospirillum* showed both rooting and sprouting, indicating the growth promoting effect of *Azospirillum*.

18 May 1985

1. Boddey, R. M. and Dobereiner, J., *Non Symbiotic Nitrogen Fixation and Organic matter in the Tropics.* 12th International Congr, Soil Sci., New Delhi, 1982, p. 28.
2. Govindan, M. and Vikraman Nair, R., *Proc. PLACROSYM VI* (in press).
3. Subba Rao, N. S., *Can. J. Microbiol.*, 1983, **29,** 863.
4. Gaskins, M. H. and Hubbell, D. H., *The soil root interface,* (eds) J. L. Harley and R. R. Russel, Academic Press, New York, 1979, p. 175.
5. Baldani, V. L. and Dobereiner, J., *Soil Biol. Biochem.*, 1980, **12,** 433.
6. Tarrand, J. J., Krieg, N. R. and Dobereiner, J., *Can. J. Microbiol.*, 1978, **24,** 967.
7. Mahadevan, A. and Sridhar, R., *Methods in physiological plant pathology*, Sivakami Publications, Madras, 1982, 316.
8. Govindan, M., *Studies on biological nitrogen fixation by Azospirillum in pearlmillet, Pennisetum americanum* (L.) Leeke. M Sc. (Ag) Thesis, Tamil Nadu Agricultural University, Coimbatore, India.

9. Dewan, G. I. and Subba Rao, N. S., *Plant Soil*, 1979, **53**, 295.
10. Anon., *Package of practices recommendations*, Kerala Agricultural University, Vellanikkara, Kerala, India, 1982, p. 199.

A NOTE ON THE SEXUALITY AND MONOSPOROUS FRUITING OF *TRAMETES RIGIDA* BERK.

S. DUTTA and ANJALI ROY
Mycology Laboratory, Department of Botany, Visva-Bharati, Santiniketan 731 235, India.

IMPORTANCE of the study of sexuality of polypore fungi was greatly increased, particularly when Nobles[1,2] showed that this character may be used as an important taxonomic criterion. Interfertility tests have been made with a large number of fungi[1-8] and in many cases the results obtained have been utilized in solving taxonomic problems. The present paper gives the sexuality pattern of *Trametes rigida* Berk., a polypore common in India; with a note on the monokaryotic fruiting of one of its isolates.

Three collections from Visva-Bharati Mycological Herbarium (VBMH) (82464, 82465, 82466) of the fungus were made locally from dead logs of *Shorea robusta* Gaertn. f. Single spore cultures were obtained from fresh basidiocarps of each collection and their type of polarity was determined by pairing monosporous cultures in all possible combinations. Intracollection matings of these mycelia resulted in the following groups:

VBMH (82464)

A_1B_1: 1,3,5,16	A_1B_2: 6,9,10,12,14,15
A_2B_2: 2,4,11,18	A_2B_1: 7,8,13,17,19,20

VBMH (82465)

A_3B_3: 1,3,7,9,11	A_3B_4: 10,12,13,16
A_4B_4: 4,5,6,8	A_4B_3: 2,14,15

VBMH (82466)

A_5B_5: 2,3,5,6	A_5B_6: 8,11,12,17,18
A_6B_6: 4,7,9,10,15	A_6B_5: 1,13,14,16

In expressing the results, the conventional symbols A_1A_2, B_1B_2 . . . were used to designate the alleles governing interfertility. The presence of 4 mating groups in each collection indicates that the species is tetrapolar. Inter-collection pairings were done using the four mating groups of the three isolates and in all pairings mycelia with clamp connections were obtained. This proves that the three collections are conspecific and have multiple alleles at the mating type loci.

Table 1

VBMH 82464 monosporous culture numbers	VBMH 82465 monosporous culture numbers				VBMH 82466 monosporous culture numbers			
	3	8	10	14	2	4	8	16
1	+	+	+	+	+	+	+	+
4	+	+	+	+	+	+	+	+
9	+	+	+	+	+	+	+	+
17	+	+	+	+	+	+	+	+

Polysporous cultures of all the isolates showed hyphae with clamp connections in every septum, while in their respective monosporous cultures, the hyphae were regularly simple septate. One of these isolates (VBMH 82464) produced well developed fruit bodies in some of its monosporous culture tubes (Nos. 3,9,10,11,17) and their hyphae on repeated examinations were found to be simple septate. Moreover, all these fruitings were fertile producing tetrasterigmatic basidia and basidiospores, typical of the natural fruit bodies in size and shape. The fruiting monosporous isolates were paired with the four representative mating groups of each of the two other isolates and the result obtained is given below where '+' sign indicates the formation of clamp connections (table 1). In each pairing there developed mycelia with clamp connections at all septa. Pairing experiment was repeated several times and always the result was the same.

Genetic interpretation of this behaviour of a particular isolate of a tetrapolar species is rather difficult. If in the pairing experiment only one mating type would have emerged from each monosporous fruiter, then conclusion could be drawn that it is homokaryotic fruiting. But as all the pairings evolved mycelia with clamp connections and the species is tetrapolar, it seems that this isolate VBMH (82464) shows a tendency of homothallism.

15 May 1985

1. Nobles, M. K., *Can. J. Res. C.*, 1948, C **21**, 211.
2. Nobles, M. K., Macrae, R. and Tomlin, B. P., *Can. J. Bot.*, 1957, **35**, 377.
3. Boidin, J. and Des Pomeys, M., *Bull. Soc. Mycol. France*, 1961, **78**, 237.