SWEET POTATO AS A CULTURE MEDIUM INGREDIENT FOR *Sclerotium rolfsii* Sacc.

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ABSTRACT

Suitability of sweet potato as a culture medium ingredient for *Sclerotium rolfsii Sacc.* was studied. *S. rolfsii* grew in the culture media where sweet potato was used as a substitute for white potato in the preparation of potato-dextrose agar (PDA). The fungus on PDA produced profuse, aerial, and straight mycelia and abundant sclerotia. In cultures with varied proportions of sweet potato as ingredient, mycelial growth was characterized as creeping, branched and scanty to profuse; very few sclerotia were formed. Sweet potato leaves or stems as natural substrate for *S. rolfsii* supported profuse and aerial mycelial growth; abundant sclerotia were also formed.

Sclerotia of *Sclerotium rolfsii* Sacc. are frequently used in various types of research because they are readily produced in culture (Linderman & Gilbert, 1973). Backman and Kabana (1974) showed that *S. rolfsii* grew well in an agar medium, did not lyse, and had moderately dense growth. Christias and Lockwood (1973) proposed that nutrient deprivation may induce the formation of sclerotia. They also stated that the time of maturation of the sclerotia of *Rhizoctonia solani* Kühn and *S. rolfsii* was closely related to the time of depletion of carbohydrates on the media. Ou (1972) noted that *S. rolfsii* grew luxuriantly on many culture media producing white aerial mycelium and abundant sclerotia.

Studies have shown that fungi differ in their nutrient requirements, as pointed out by Zentmyer *et al.* (1976) on the growth of *Phythophthora cinnamomi* Rands. Generally, however, fungi require carbohydrates, a substance amply provided by white potato (*Solanum tuberosum* Linn.). Sweet potato (*Ipomoea batatas* (Linn.) Lam.) is another source of carbohydrates. It is readily available and abundant locally and may prove to be a good substitute for white potato in artificial media.

Two methods were used in the study: (1.) White potato in PDA was substituted with sweet potato tubers; and, (2.) Stems and leaves were cut into 2 cm pieces and sterilized in flasks.

The plates were centrally seeded with sclerotial halves while the flasks were inoculated with culture pieces of *S. rolfsii.*

Table 1 shows the behavior of the fungus when 20 different varieties of sweet potato tubers were used in culture media. Usually, sclerotia were observed at the edge of the culture. Yellowish water droplets were sometimes noticed clinging to the side of sclerotia (Fig. 1).

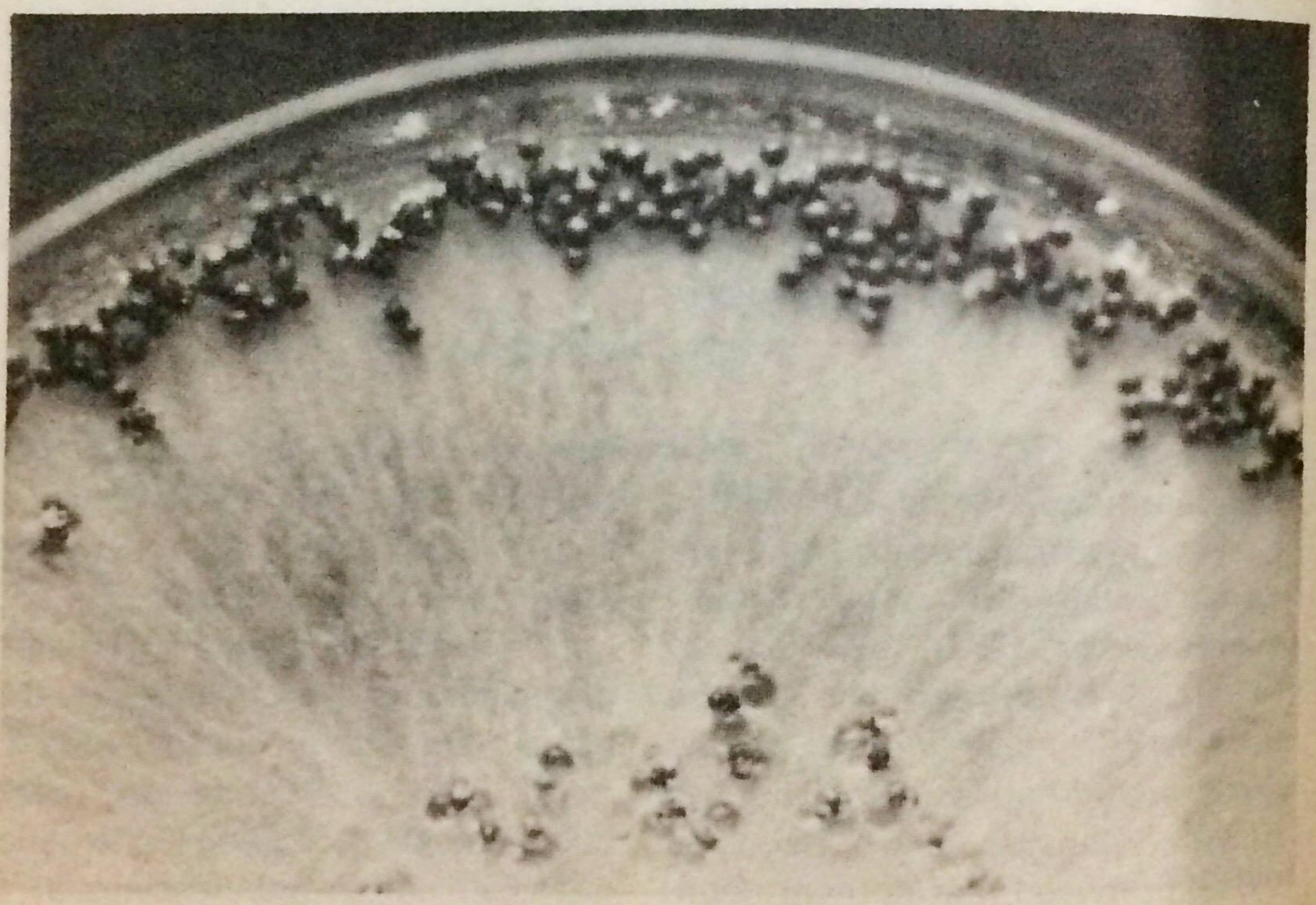

Fig. 1. Sclerotial formation in sweet potato dextrose agar. (Note the water droplets clinging to the side of the sclerotia at the center of the plate.)

Table 1. Growth characteristics and sclerotial formation of *Sclerotium rolfsii* on different varieties of sweet potato used in the preparation of sweet potato-dextrose agar.

Sweet Potato Variety	Growth Characteristics	Number of sclerotia[1]	Colony diameter after 5 days (mm)	Average daily growth[2] (mm)
Control (PDA)	Very profuse white aerial and straight mycelia	144	90.0	26.1
Samar Big Yellow	Fairly profuse grayish mycelia	7	86.7	22.7
Kinarusa	Fairly profuse dirty white mycelia	6	83.5	19.1
Bohol	Fairly profuse white mycelia	5	76.3	19.4
Kasensyo	Fairly profuse white mycelia	20	74.0	19.2
P.I. 286623	Profuse dull white mycelia	13	73.3	18.0
Kinangkong	Scanty thin grayish mycelia	3	82.9	19.5
Trescolores	Not profuse very thin grayish mycelia	5	76.1	16.1
UPLB 8	Profuse dull white mycelia	15	81.7	15.1
Makabuhi	Not profuse very thin grayish mycelia	11	67.9	14.0
Tainong	Not profuse very thin grayish mycelia	2	74.1	16.5
Kadali	Not profuse very thin grayish mycelia	4	69.4	16.4
UPLB 76	Not profuse thin grayish mycelia	5	43.3	9.6
Kaimay	Not profuse thin grayish mycelia	1	40.0	11.0
Acc. 124	Scanty thin grayish mycelia	0	49.3	13.7
Winaray	Not profuse very thin mycelia	2	76.3	19.5
Senador	Not profuse thin grayish mycelia	3	75.2	19.1
Tinirining	Not profuse grayish mycelia	5	84.6	18.8
Inanahaw	Not profuse dirty white mycelia	5	84.0	18.5
Davao 1	Not profuse thin white mycelia	7	88.3	22.7
BNAS 51	Profuse white aerial mycelia	0	90.0	24.2

[1] Determined 14 days after planting.
[2] Differences in daily mycelial growth until mycelia covered the plate.

Profuse mycelial growth and abundant sclerotia were observed in cultures containing cultivars Kinarusa, Bohol, Kasensyo, Samar Big Yellow and P.I. 286623. Differences in nutrient derived from the different varieties of sweet potato used accounted for the variations in growth characteristics and number of sclerotia formed.

Size, color and shape of sclerotia also varied with the different varieties of sweet potato tested. The size of sclerotia ranged from 0.8 to 3.0 mm; sclerotia color from light to dark brown; and shape from globose to ellipsoid. Similar observations were made by Heald (1933) and Ou (1972) who observed that sclerotia of *S. rolfsii* were spherical and ellipsoid, varying according to strain and nutritional conditions.

Usually with a higher amount of sweet potato tubers, growth of *S. rolfsii* was profuse with aerial mycelia, while in cultures with lesser amount of sweet potato tubers, mycelial growth was scanty. These variable characteristics may be due to the chemical composition of sweet potato tubers used in preparing the culture media. As Madamba and San Pedro (1976) reported, different varieties of sweet potato differed in chemical composition.

S. rolfsii was observed to grow faster in cultures with increasing amounts of sweet potato (Table 2). In PDA, *S. rolfsii* covered the Petri

Table 2. Rate of growth (mm/day) of *Sclerotium rolfsii* as influenced by varying proportions of five sweet potato varieties used in the preparation of sweet potato-dextrose agar. [1]

Weight of tubers [2] (g/1000 ml)	Sweet potato variety					Average
	Bohol	Kasensyo	Samar Big Yellow	Kinarusa	P.I. 286623	
50	16.0	18.7	16.2	16.2	13.9	16.2
100	16.0	19.1	16.3	15.6	15.6	16.5
200	16.0	19.2	15.3	18.2	15.7	16.9
300	15.9	19.2	16.4	18.7	16.0	17.2
400	17.4	19.3	18.3	17.9	17.5	18.1
500	19.5	19.4	18.5	17.1	17.7	18.4
600	22.2	19.3	19.3	19.1	18.9	19.8
Average	17.6	19.2	17.2	17.5	16.5	17.6
Control (PDA)						23.7

[1] Data taken daily until mycelia covered the plate.
[2] Substituted for white potato in the preparation of sweet potato-dextrose agar.

dish in 5 to 6 days, while in cultures with varied amounts of sweet potato, the fungus covered the Petri dish in 5 to 8 days after planting. These differences can be attributed to the characteristic of the fungus itself and to the nutrient content of the medium with varied proportion of sweet potato.

S. rolfsii produced sclerotia within 4 to 5 days in PDA while in media containing sweet potato, they were produced after at least 6 days but within 14 days.

Madamba and San Pedro (1976) showed that sweet potato was low in ash, protein and fat (2.30, 2.71, and 0.69%, respectively) but contained large amounts of starch (76.1%). On the other hand, white potato was low in ash and fat content (1.38 and 0.13%, respectively) but contained a higher amount of protein (6.84%) and a lower amount of starch (62.9%). Amylose content of white potato was higher (24.6%) than sweet potato (20.1%).

Apparently, starch content of the medium is not the only factor involved in sclerotial formation. The number of sclerotia did not increase in 50 and 100 g proportions even with longer incubation. Three reasons may be advanced to explain this phenomenon: (a) protein, which is 4.13% lower in sweet potato than in white potato, may also be a limiting requirement of mycelial growth and sclerotial formation; (b) proportions lower than 200 g of sweet potato tubers produced scanty mycelia thereby producing few sclerotia; and, (c) the quality of starch in white potato may be more favorable to sclerotial formation than that of sweet potato.

Sclerotia produced from the sweet potato medium germinated and grew when transferred back to PDA.

In cultures which used leaves as natural substrate, profuse and aerial mycelia were observed. The use of stem as natural substrate supported a compact growth with mycelium creeping instead of aerial. On the mixed substrate (stem + leaves), mycelial growth was not initially profuse. However, when incubated longer than 5 days, mycelial growth became profuse and aerial.

Sclerotial formation was abundant in cultures with leaves and in substrates with both stem and leaves.

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