Influence of various health drinks media on growth and sporulation of *Nomuraea rileyi* (Farlow) Samson isolates

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ABSTRACT

Evaluation of the growth and sporulation *Nomuraea rileyi* isolates on different health drinks sources media showed potato maltova agar was significantly superior to other media and supported the maximum biomass, mycelial growth and conidial count. In case of PDBC isolate, among the six different health drinks sources tested, the maximum radial growth, biomass and spore production were observed in potato maltova agar medium both in solid as well as in the liquid medium. Similar trend of growth and development was observed with DOR and local isolates of *N. rileyi*.

Key words: *Nomuraea rileyi*, health drinks media, radial growth, biomass, spore production

INTRODUCTION

Success of any microbial control programmes depends on production of sufficient quantity of inoculum for field application. Efficient production technologies have been developed for laboratory and commercial use of entomopathogenic fungi most of them are facultative pathogens and can be mass produced in synthetic, semi synthetic or natural media containing suitable nutrient source. Selection of strains of fungi having high virulence, good growth and sporulation is considered as an important criteria in mass multiplication. Hence the present study was taken up to test for six different brands health drink based media for the growth and development of *N. rielyi* isolates.

MATERIALS AND METHODS

The three fungal isolates of *N. rielyi* (PDBC, DOR and LOCAL) were maintained at the Department of Agricultural Entomology, Agricultural College and Research Institute, Madurai. The fungal isolates maintained in the standard mycological media and incubated for 10 days at 25°C, dishes showing good fungal growth were selected for the experimental inoculation. The media prepared from six different health drinks sources *viz.*, boost, horlicks, maltova, viva, complan and bournvita 20 gm / lit along with potato extract (200 gm / lit) and agar (20 gm / lit). Observations were taken on radial growth, biomass and spore count as follows.

Radial growth

The growth rate of mycelia in terms of diameter of fungal mat (mm) was assessed on solid medium. A fungal disc measuring 0.5 cm of the respective isolates before sporulation was inoculated at the centre of the plate. The inoculated agar plates were incubated at 25 ± 1ºC for 15 days. Growth of the colony (dia in mm) was measured at an interval of 3 days (Hall and Bell, 1961).

Biomass production and Spore count

Fifty ml of the different nutrient sources medium was transferred to 250 ml conical flasks in 5 replicates without agar. Flasks were pluffed with non absorbent cotton and sterilized at 15psi for 20 min. After cooling 10 mm discs of the fungus grown on the respective mycological medium in petri dishes were cored out using a flame sterilized cork borer under aseptic condition and incubated for 15 days. After incubation at 25 ± 1ºC the individual broth cultures were filtered through pre – weighed Whatman No. 1 filter papers. The mycelial mats collected on the filter papers weight accounted for the dry mycelial weight or biomass (Hall and Bell, 1961).

Fungal mat was macerated with pestle and mortar using 0.02 per cent Tween 80 as an emulsifier to get uniform spore suspension. Spores were further extracted by passing the suspension through a muslin cloth. The filtrate was assessed with the help of improved Neubauer's haemocytometer (Jones, 1962).

RESULTS AND DISCUSSION

PDBC isolate

In health drink medium, the excellent growth of the fungus was obtained with potato maltova agar (44.50 mm), compared to potato Bournvita agar with lesser radial growth of 35.50 mm. The potato maltova agar medium was

Table 1. Influence of different sources of health drink medium on the growth and sporulation of *N. rileyi* (PDBC isolate)

Health drink medium	Solid medium				Liquid medium	
	Radial growth (mm)			Sporulation on 15^{th} day (10^7 / ml)*	Biomass(gm)*	Sporulation on
	15^{th} day (10^7 / ml)*					
	5^{th} day	10^{th} day	15^{th} day			
Potato boost agar	6.75^{a}	28.33^{b}	42.00^{b}	2.415^{b}(0.382)	1.22^{a}(1.099)	3.103^{b}(0.492)
Potato horlicks agar	6.00^{b}	27.00^{c}	41.00^{b}	1.972^{c}(0.294)	0.87^{c}(1.932)	2.716^{c}(0.434)
Potato maltova agar	6.50^{ab}	29.13^{a}	44.50^{a}	2.571^{a}(0.410)	1.05^{b}(1.021)	3.764^{a}(0.576)
Potato viva agar	5.33^{c}	24.00^{d}	37.50^{c}	1.726^{d}(0.237)	0.62^{e}(0.784)	2.001^{d}(0.301)
Potato complan agar	5.25^{c}	23.13^{e}	36.50^{cd}	1.416^{e}(0.151)	0.70^{d}(0.838)	1.876^{e}(0.273)
Potato bournvita agar	5.10^{c}	21.00^{f}	35.50^{d}	1.373^{f}(0.138)	0.57^{f}(0.760)	1.763^{f}(0.245)
CD (P = 0.05)	0.5052	0.5237	1.0271	0.0013	0.0132	0.0014
SEd	0.2319	0.2404	0.4714	0.0006	0.0060	0.0006

* Values are mean of five replications. Figures in parentheses represent log transformation (spore yield) and square root transformation (biomass).Means in a column followed by same superscript letters are not significantly different according to DMRT at P =0.05. PDBC – Project Directorate of Biological control, Bangalore

significantly superior in spore production (2.571 x 10^7 spores per ml) and the lowest spore yield was recorded potato Bournvita agar (1.373 x 10^7 spores per ml). Incase of liquid medium, the maximum biomass was recorded in potato boost agar medium (1.22 gm). The minimum biomass production of 0.57 gm was observed in potato bournvita agar media. In liquid medium the maximum spore production was observed in potato maltova agar medium (3.764 x 10^7 spores per ml). The minimum spore production was recorded in potato bournvita agar (1.763 x 10^7 spores per ml) (Table 1).

DOR isolate

Maximum radial growth was recorded in potato maltova agar medium (43.16 mm). While the minimum radial growth was observed in potato Bournvita agar (36.15 mm). In solid medium, potato maltova agar was found significantly superior to all other media with abundant sporulation (2.688 x 10^7 spores per ml). The potato Complan agar and potato bournvita agar produced comparatively lower sporulation (1.372 x 10^7 and 1.338 x 10^7 spores per ml,).In liquid medium, the biomass production was found to be higher in potato Boost agar (1.23 gm). The lowest biomass yield was recorded in potato Bournvita agar (0.64 gm). In liquid medium the maximum spore production was observed in potato Maltova agar medium (3.586 x 10^7 spores per ml). This was followed by potato Boost agar (3.114 x 10^7 spores per ml). The spore production was significantly reduced and the least spore yield was recorded in potato complan agar and potato Bournvita agar with 1.764 x 10^7 and 1.095 x 10^7 spores per ml, respectively (Table 2).

Table 2. Influence of different sources of health drink medium on the growth and sporulation of *N. rileyi* (DOR isolate)

Health drink medium	Solid medium				Liquid medium	
	Radial growth (mm)*			Sporulation on 15^{th} day(10^7 / ml)*	Biomass(gm)*	Sporulation on 15^{th} day (10^7 / ml)*
	5^{th} day	10^{th} day	15^{th} day			
Potato boost agar	6.35^{a}	27.25^{b}	41.16^{b}	2.127^{b}(0.328)	1.23^{a}(1.107)	3.114^{b}(0.493)
Potato horlicks agar	6.00^{b}	26.25^{c}	40.33^{c}	1.872^{c}(0.272)	0.97^{c}(0.984)	2.798^{c}(0.447)
Potato maltova agar	6.33^{a}	28.43^{a}	43.16^{a}	2.688^{a}(0.429)	1.13^{b}(1.064)	3.586^{a}(0.555)
Potato viva agar	5.50^{c}	23.50^{d}	38.50^{d}	1.591^{d}(0.202)	0.72^{e}(0.848)	2.043^{d}(0.303)
Potato complan agar	5.10^{d}	23.00^{e}	37.00^{e}	1.372^{e}(0.137)	0.81^{d}(0.901)	1.7646^{e}(0.250)
Potato bournvita agar	5.00^{e}	22.50^{f}	36.15^{f}	1.338^{f}(0.127)	0.64^{f}(0.796)	1.095^{f}(0.197)
CD (P = 0.05)	0.0794	0.0726	0.3631	0.0015	0.0200	0.0012
SEd	0.0367	0.0333	0.1667	0.0007	0.0092	0.0006

* Values are mean of five replications. Figures in parentheses represent log transformation (spore yield) and square root transformation (biomass) Means in a column followed by same superscript letters are not significantly different according to DMRT at P = 0.05. DOR – Directorate of Oilseeds Research, Hyderabad

Table 3. Influence of different sources of health drink medium on the growth and sporulation of *N. rileyi* (Local isolate)

Health drink medium	Solid medium				Liquid medium	
	Radial growth (mm)*			Sporulation on 15th day(10^7 / ml)*	Biomass(gm)*	Sporulation on 15th day (10^7 / ml)*
	5th day	10th day	15th day			
Potato boost agar	6.25[a]	26.00[b]	42.00[a]	1.999[b](0.301)	1.07[a](1.034)	2.992[b](0.476)
Potato horlicks agar	5.25[b]	25.15[c]	39.00[b]	1.990[b](0.299)	0.79[c](0.889)	2.635[c](0.421)
Potato maltova agar	6.10[a]	27.00[a]	42.00[a]	2.7396[a](0.438)	1.03[b](1.016)	3.007[a](0.478)
Potato viva agar	4.60[c]	23.50[d]	37.33[c]	1.616[c](0.209)	0.61[e](0.782)	2.106[d](0.323)
Potato complan agar	4.85[c]	23.00[e]	36.50[d]	1.414[d](0.148)	0.66[d](0.810)	1.769[e](0.247)
Potato bournvita agar	4.00[d]	22.00[f]	35.15[e]	1.374[e](0.138)	0.58[f](0.761)	1.739[f](0.240)
CD (P = 0.05)	0.2287	0.4730	0.5353	0.0022	0.0141	0.0014
SEd	0.1050	0.2171	0.2457	0.0010	0.0065	0.0007

* Values are mean of five replications. Figures in parentheses represent log transformation (spore yield) and square root transformation (biomass). Means in a column followed by same superscript letters are not significantly different according to DMRT at P=0.05. Local isolate collected from Coimbatore (Thondamuthur).

Local isolate

The excellent growth of the fungus was obtained with potato maltova agar (42.00 mm) potato complan agar and potato bournvita agar recorded comparatively lesser growth of 36.50 mm and 35.15 mm, respectively. Potato maltova agar was found significantly superior to other media by recording abundant sporulation of 2.7396 x 10^7 spores per ml. Potato bournvita agar produced comparatively lower sporulation (1.414 x 10^7 and 1.374 x 10^7 spores per ml). In case of liquid medium, the maximum biomass was recorded in potato boost agar medium (1.07 gm) and potato maltova agar (1.03 gm). The minimum biomass production of 0.61 gm and 0.58 gm were observed in potato viva agar and potato bournvita agar media, respectively. In liquid medium the maximum spore production was observed in potato maltova agar medium (3.007 x 10^7 spores per ml). The minimum spore production was recorded in potato bournvita agar (1.739 x 10^7 spores per ml) (Table 3).

Among the different media tested, Maltova agar medium recorded the maximum radial growth, biomass and spore production followed by boost agar media. This is in concordance with earlier work of Shyamala (2006), who reported that maximum mycelial growth and spore production of *Saracladium oryzae* (Went.) was observed in boost agar and Maltova agar medium. Likewise Sonai Rajan *et al*. (2008 and 2009) recorded the maximum radial growth, biomass and spore production in different carbon, nitrogen and semi synthetic sources. The reason for the highest growth parameters might be due to the presence of large amount of minerals, vitamins and other essential nutrients in the Maltova and Boost agar media when compared to other test media.

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