Hortin-Mushrooms

Strain evaluations at PPO Horst, The Netherlands

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APPLIED PLANT RESEARCH
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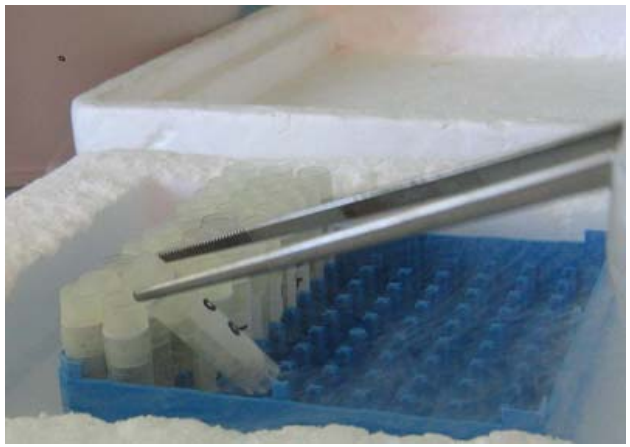
PPO Collection

- 5000 strains
  - 120 species
  - 60 shiitake strains (*Lentinula edodes*)
  - 167 oyster mushroom strains (*Pleurotus ostreatus*)
  - 24 king oyster mushroom (*Pleurotus eryngii* var, *eryngii, nebrodensis, ferulae*)

Storage of strains



Species evaluated

- Shiitake (*Lentinula edodes*)
- Oyster mushroom (*Pleurotus ostreatus*)
- King oyster mushroom (*Pleurotus eryngii*)

Testing shiitake strains from PPO collection

- In plastic bags
  - 5 kg per bag
  - Filter in upper part of bag
  - What is water content of substrate??????

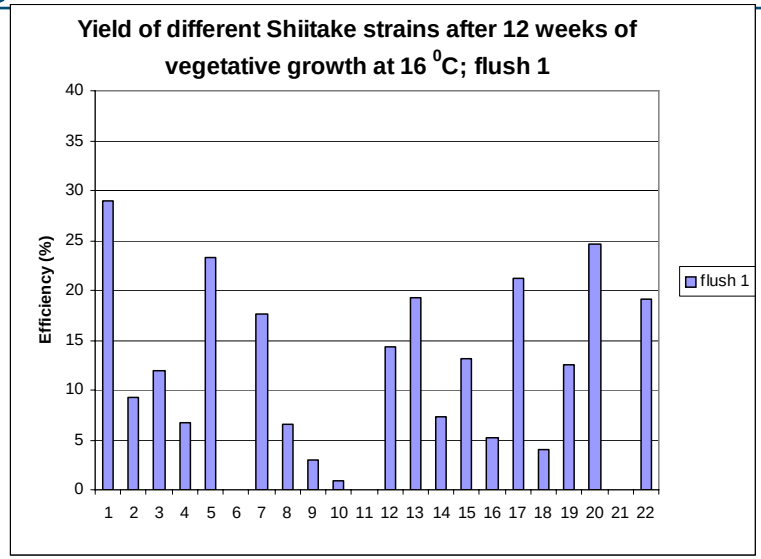
Ingredients	amount
Sawdust	5 m^3 (beech; 30-40% moisture)
Chopped Straw	20 kg
Corn meal	150 kg
Linseed	75 kg

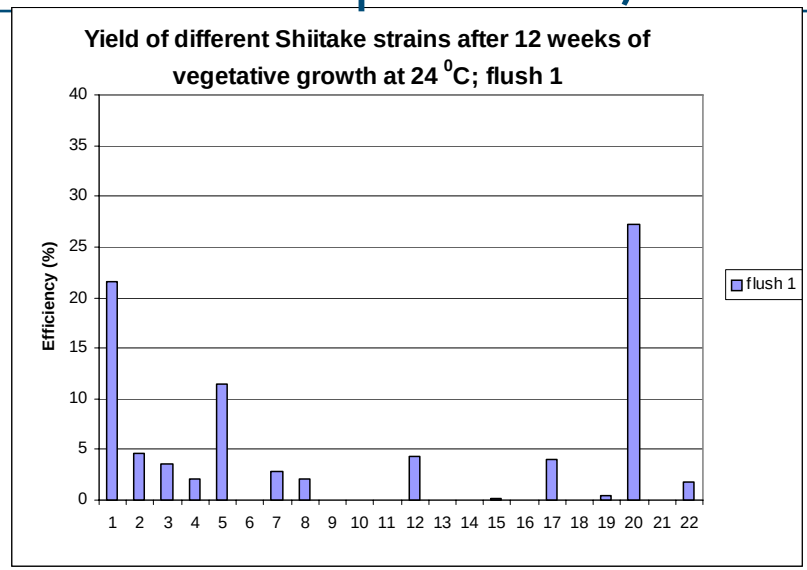
Figure 4. Left an impression of the incubation room for the vegetative growth phase. Bags of approximately 5 kg substrate were inoculated with pure cultures of different shiitake lines and incubated for different periods. After vegetative growth plastic was removed and the blocks were transported to a production room. Above a block from which plastic was removed after only a short period of vegetative growth. This was done because mushrooms started to form under need the plastic. As can be seen, browning of this block is incomplete (only the top part shows some browning.

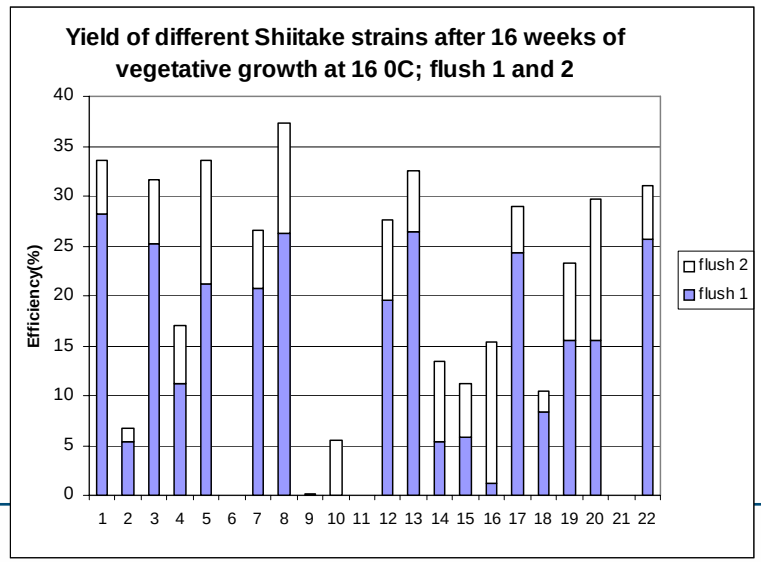
Evaluation Issues

- Short versus long vegetative growth
- 16 versus 24 ^{0}C during fruiting

Yield (influence of incubation time and temperature)







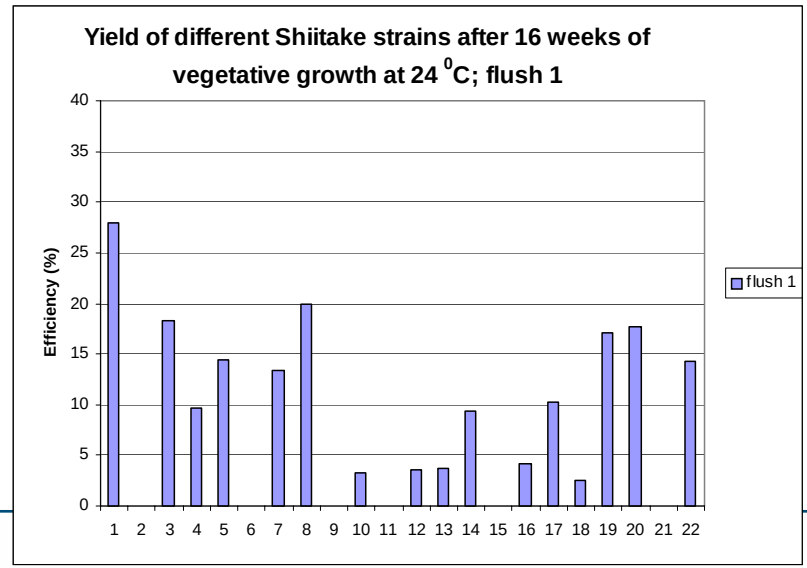


Figure 5. Graphical interpretation of production at 16 ^{0}C.

Figure 6. Graphical interpretation of production at 24 ^{0}C.

16 weeks vegetative growth; production at 16 oC

Strain 1 (4B Su Xiang, China), 7 days after removal of the bag.

Strain 1 (4B Su Xiang, China), 9 days after removal of the bag.

16 weeks vegetative growth; production at 16 oC

Strain 1 (4B Su Xiang, China), 7 days after removal of the bag.

Strain 1 (4B Su Xiang, China), 9 days after removal of the bag.

16 weeks of vegetative growth; production at 16 ^{o}C

Strain 3 (sh 02/02, 2477, China) 7 days after removal of the bag.

Strain 3 (sh 02/02, 2477, China) 9 days after removal of the bag.

16 Weeks vegetative growth; production at 16 ^{o}C

Strain 7 (sh 02/06, Japan), 7 days after removal of bag.

Strain 7 (sh 02/06, Japan), 9 days after removal of bag.

16 weeks vegetative growth; production at 16 ^{0}C

Strain 8 (sh 02/07, China), 7 days after removal plastig bag.

Strain 8 (sh 02/07, China), 9 days after removal plastig bag.

16 Weeks vegetative growth; production at 16 ^{0}C.

Strain 13 (sh 03/04 H600, Japan) 7 days after removal plastig bag.

Strain 13 (sh 03/04 H600, Japan) 9 days after removal plastig bag.

16 weeks vegetative growth; production at 16 oC

Strain 1 (4B Su Xiang, China), 7 days after removal of the bag.

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Strain 13 (sh 03/04 H600, Japan) 9 days after removal plastig bag.

16 Weeks vegetative growth; production at 16 ^{0}C.

Strain 22 (Mycelia 3715, commercial)
7 days after removal bag.

Strain 22 (Mycelia 3715, commercial)
9 days after removal bag.

Strain evaluation of Oyster Mushroom (*Pleurotus ostreatus*)

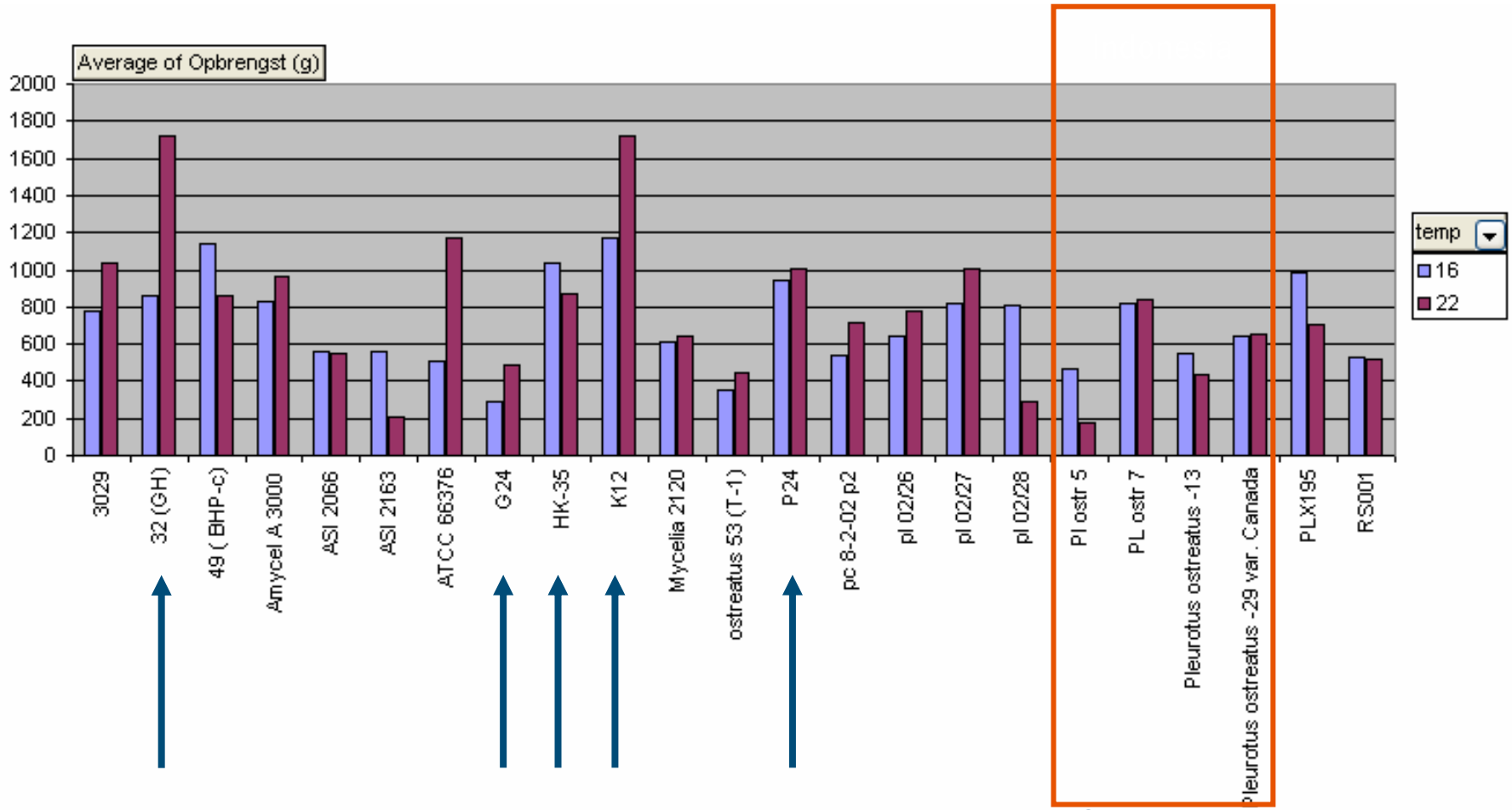
- 40 genetically different *P.ostreatus* strains
  - 4 Indonesian strains
  - European commercial strains
  - China, South Korea, Japan, Russia
- Production at 16 ^{o}C and 22 ^{o}C

Substrate

- Weed straw
  - Pasteurized
  - 18 kg per bag
  - Plastic (micro perforation)

Production method in the Netherlands

Production oyster mushroom strains at 16 and 22 °C



Strains handed over to IVEGRI

Strains from Indonesia

HK35 European commercial

16 °C

22 °C

P24 European commercial

16 °C

22 °C

K12 European commercial

16 °C

22 °C

32 (GH) Wild Hungarian

16 °C

22 °C

Color of fruit bodies at diff. growth temperatures

Strain	16 °C	22 °C
HK35	73.30	67.28
32 (GH)	70.19	76.19
Pleurotus ostreatus -5	76.78	82.92
Pleurotus ostreatus -7	79.16	83.20
Pleurotus ostreatus -29 var. Canada	80.55	80.54
pl 02/27	73.34	72.16
Pleurotus ostreatus -13	79.47	77.99
pl 02/28	50.12	50.06
3029	59.27	60.45
49 (BHP-c)	76.65	80.04
G24	83.93	76.79
RS001, Pleurotus spp.	66.92	79.62
pl 02/26	66.31	72.98
ostreatus 53 (T-1)	62.27	71.12
Mycelia 2120	70.30	77.04
pc 8-2-02 p2	67.24	71.77
Amycel A 3000	71.02	79.04
ATCC 66376	75.59	73.39
ASI 2066	82.09	84.93
K12	67.96	70.49
PLX195	64.58	72.03
Ital spawn P24	68.63	76.24

L: Lightness of fruit bodies (Minolta measurement)

New Species for Indonesian Market

- King Oyster mushroom (*Pleurotus eryngii)*
  - Suitable for Indonesian culture conditions
  - Yield
  - Quality

Substrate formulas for *Pleurotus eryngii*

N	Saw dust	corn meal	linseed	Water	Total kg
0.8% N	44.11	8.30	4.34	43.25	100.00
1.4% N	26.69	15.89	8.21	49.21	100.00
2.0% N	10.21	22.97	11.86	54.88	99.92

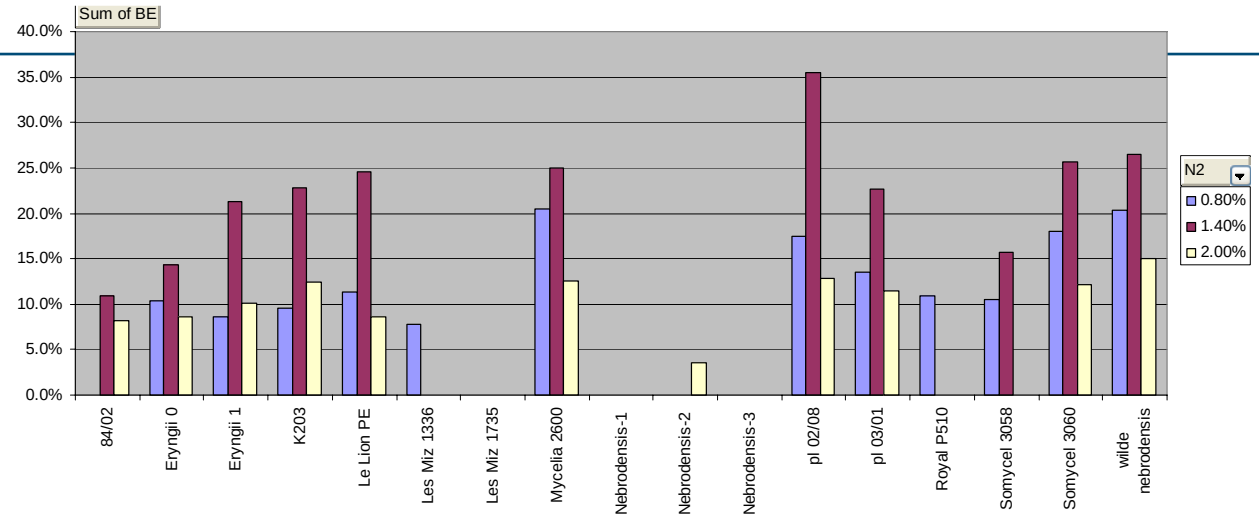
Table 2. Substrate composition at different N-percentages.

Yield (biol. eff.)

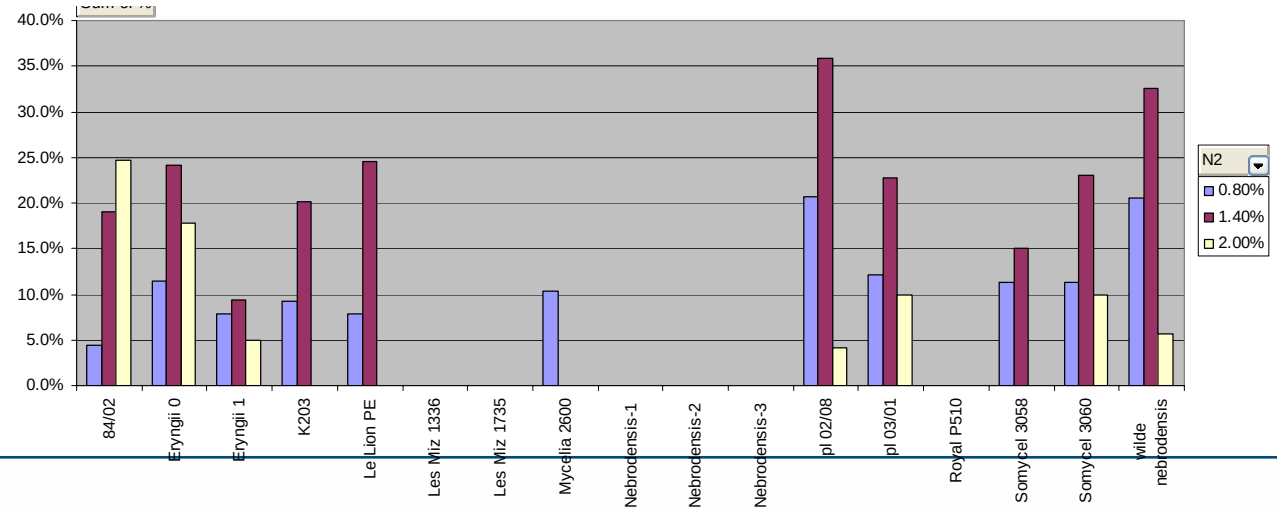
	Nitrogen content substrate			Species	Strain
Strain	0.8 % N	1.4 % N	2.0 % N	ITS	ISSR
84/02	0.0%	10.9%	8.2%	3	9
Eryngii 0	10.4%	14.3%	8.6%	3	3
Eryngii 1	8.6%	21.3%	10.2%	1	2
K203	9.5%	22.8%	12.4%	1	6b
Le Lion PE	11.3%	24.6%	8.6%	n.d.	n.d.
Les Miz 1336	7.8%	0.0%	0.0%	3	12
Les Miz 1735	0.0%	0.0%	0.0%	3	8
Mycelia 2600	20.5%	25.0%	12.5%	2	5b
Nebrodensis-1	0.0%	0.0%	0.0%	3	4c
Nebrodensis-2	0.0%	0.0%	3.6%	3	4a
Nebrodensis-3	0.0%	0.0%	0.0%	3	4b
pl 02/08	17.5%	35.4%	12.8%	2	5c
pl 03/01	13.5%	22.7%	11.5%	1	6a
Royal P510	10.9%	0.0%	0.0%	3	10
Somycel 3058	10.6%	15.8%	0.0%	3	7
Somycel 3060	18.0%	25.6%	12.2%	1	6c
wild nebrodensis	20.4%	26.5%	15.0%	2	5a
Production of *Pleurotus eryngii* types at **16 °C**.					

	Nitrogen content substrate			Species	Strain
Strain	0.8 % N	1.4 % N	2.0 % N	ITS	ISSR
84/02	4.4%	19.0%	24.6%	3	9
Eryngii 0	11.5%	24.2%	17.8%	3	3
Eryngii 1	7.8%	9.4%	4.9%	1	2
K203	9.2%	20.2%	0.0%	1	6b
Le Lion PE	7.9%	24.6%	0.0%	n.d.	n.d.
Les Miz 1336	0.0%	0.0%	0.0%	3	12
Les Miz 1735	0.0%	0.0%	0.0%	3	8
Mycelia 2600	10.3%	0.0%	0.0%	2	5b
Nebrodensis-1	0.0%	0.0%	0.0%	3	4c
Nebrodensis-2	0.0%	0.0%	0.0%	3	4a
Nebrodensis-3	0.0%	0.0%	0.0%	3	4b
pl 02/08	20.7%	35.9%	4.1%	2	5c
pl 03/01	12.2%	22.7%	9.9%	1	6a
Royal P510	0.0%	0.0%	0.0%	3	10
Somycel 3058	11.3%	15.1%	0.0%	3	7
Somycel 3060	11.3%	23.1%	10.0%	1	6c
wild nebrodensis	20.6%	32.6%	5.6%	2	5a
Production of *Pleurotus eryngii* types at **22 °C**.					

Tabel 3. Yield of different *P. eryngii* strains at 2 temperatures and 3 different concentration of nitrogen in the substrate. Yield is expressed as % BE (biological efficiency, i.e. ratio fresh weight fruitbody and fresh weight substrate).



Production temperature: 16 °C



Production temperature: 22 °C

Pl 02/08; 1.4% N; 16 °C

Eryngii 0; 1.4% N; 16 °C

Pl 03/01; 1.4% N; 16 °C

Pl 02/08; 1.4% N; 22 ºC

Pl 02/08; 1.4% N; 22 ºC

Nitrogen concentrations

Somycel 3060; 22 oC; 0.8; 1.5 and 2.0 % N

Nitrogen concentrations

K203; 22 oC; 0.8; 1.5 and 2.0 % N

Nitrogen concentrations

Wild nebrodensis; 22 oC; 0.8; 1.5 and 2.0 % N

Nitrogen concentrations

Wild nebrodensis; 16 °C; 0.8; 1.5 and 2.0 % N

Nitrogen concentrations

PI 02/08; 16 °C; 0.8; 1.5 and 2.0 % N

Nitrogen concentrations

Pl 03/01; 16 °C; 0.8; 1.5 and 2.0 % N

Workshop in November (27?)

- Hygiene
  - Flies
  - Clean environment
- Spawn
  - Substrates
  - Preparations
- Species
  - Strain types and properties
- Substrates for cultivation

Additional workshop

- Inventory of needs of Indonesian mushroom industry
  - Substrates
  - Strains
  - Diseases

APPLIED PLANT RESEARCH
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