

Small-scale Production of Oyster Mushroom

D.K. Lee
Jeremy Shafer
Department of Crop Sciences
University of Illinois at Urbana-Champaign

D.K. Lee – Perennial Grass Agronomist

Contents

- Background
- Mushroom production in the U.S.A.
- Oyster mushroom in high tunnels
 - Research in U of I
 - Growing oyster mushroom in a high tunnel

Commercially Grown Mushroom in US

Agaricus spp. (white, button) *Agaricus spp.* (crimini) *Agaricus spp.* (portabella)

Agaricus Production in US

- A record volume of sales, 6 years in a row (6.6lbs/ft² at \$1.25/lb)

Agaricus Mushroom Volume of Sales - United States

Year	Volume (Million pounds)
06/07	~800
07/08	~800
08/09	~800
09/10	~750
10/11	~850
11/12	~880
12/13	~850
13/14	~880
14/15	~900
15/16	~920

Commercial Agaricus mushrooms: Sales volume and producer price

Year	Production (Million lbs)	Price (\$/lb)
1980	~100	~1.00
1982	~150	~1.00
1984	~200	~1.00
1986	~250	~1.00
1988	~300	~1.00
1990	~350	~1.00
1992	~400	~1.00
1994	~450	~1.00
1996	~500	~1.00
1998	~550	~1.00
2000	~600	~1.00
2002	~650	~1.00
2004	~700	~1.00
2006	~750	~1.00
2008	~800	~1.00
2010	~850	~1.00
2012	~900	~1.00
2014	~950	~1.00

Commercially Grown Mushroom in US

Specialty mushroom

Lentinula spp. (shitake) *Pleurotus spp.* (oyster) *Flammulina spp.* (enoki)

Specialty Mushroom Production in US

- A record sales value, up 30% from 2014-2015 (\$3.94/lb)

Table 10--Specialty mushroom production, sales and prices, 2000-2015

Crop year	Production			Volume of sales			Price per pound		
	Shiitake	Oyster	Other	Shiitake	Oyster	Other	Shiitake	Oyster	Other
	-- 1,000 pounds --			-- 1,000 pounds --			-- Dollars --		
2000/01	9,778	3,817	1,397	8,939	3,629	1,316	3.17	2.13	4.69
2001/02	8,454	4,273	1,541	8,024	4,035	1,424	2.92	2.01	4.02
2002/03	7,476	3,997	1,431	7,059	3,562	1,287	3.08	1.91	4.56
2003/04	7,762	4,208	1,692	7,542	3,968	1,651	3.24	2.05	4.47
2004/05	9,085	5,428	1,436	8,616	5,128	1,327	3.25	2.35	4.9
2005/06	8,014	4,765	1,377	7,685	4,563	1,188	3.25	2.15	4.85
2006/07	7,155	5,265	2,180	6,985	5,055	2,113	3.36	2.41	4.84
2007/08	9,848	4,371	1,330	9,673	4,253	1,330	2.69	2.88	5.16
2008/09	9,715	5,384	1,605	9,458	5,057	1,364	3.19	2.46	4.14
2009/10	6,684	6,294	3,434	6,417	5,840	3,172	2.75	2.56	2.18
2010/11	6,702	8,196	3,276	6,420	7,739	2,740	2.99	2.37	4.58
2011/12	8,413	7,505	3,414	7,999	7,031	3,083	3.42	2.56	4.82
2012/13	8,875	7,414	3,659	8,277	6,975	3,375	3.32	3.02	4.99
2013/14	9,327	7,499	1,846	8,952	7,165	1,641	3.21	3.74	6.16
2014/15	9,490	7,996	4,062	9,251	7,724	3,657	3.26	3.19	4.98
2015/16	9,929	10,617	4,993	9,743	10,054	4,290	3.61	3.60	5.51

Source: Compiled by ERS from data of USDA, NASS, "Mushrooms".

Growing Oyster Mushroom in High Tunnels



Why Oyster Mushroom???

- Higher value, good fit into local fresh-market
- Wide range of substrates materials including agricultural wastes
- Composting is not required
- Versatile ways of cultivation
- Extend a shelf life by easy-drying
- Year around cultivation



Why Oyster Mushroom???

- Nutritious values
- High in vitamin B complex and protein
- Contain mineral salts the human body needs
- Contains double the amount of calcium, phosphorus, and iron than meats
- Fat and cholesterol free



Cultivation Methods



A. Log culture



B. Shelf culture



C. Box culture



D. Bag culture



E. Bottle culture

Bag Cultivation


- Much smaller risk of crop failure compared with other methods
- Possible inside houses or unused structures
- Possible with a small initial investment
- Easy to control and diseases
- Quick return of capital
- Production is possible all year



Pleurotus ostreatus, Bag, Korea

Mushroom Research at U of I

- Oyster mushroom in tunnels
 - Media: Wheat straw, switchgrass, big bluestem, corn cob, upcycling coffee grounds
 - Strains: Golden, Italian, PoHu, Brown, Elm, Gray dove
 - Containers: bag, bottle, bucket



Jeff Kindhart, Jeremy Shafer, Julie Zakes, D. K. Lee

Poly Bags in a High Tunnel




How to Grow?

- Oyster in a bag
 - Select your variety (strain)
 - Select substrates, wheat straw or other grain straws
 - Soak the substrates with water for 16 hours
 - Fill the substrate in a bag and steam to 160F
 - Inoculate the bags with the spawn (up to 5% of the wet weight of the substrate)
 - Incubate for 2 weeks at 65-75F and move to the high tunnel
 - Harvest mushroom

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Oyster Mushrooms



Golden (60-85F)



Blue, Gray dove (45-65F)



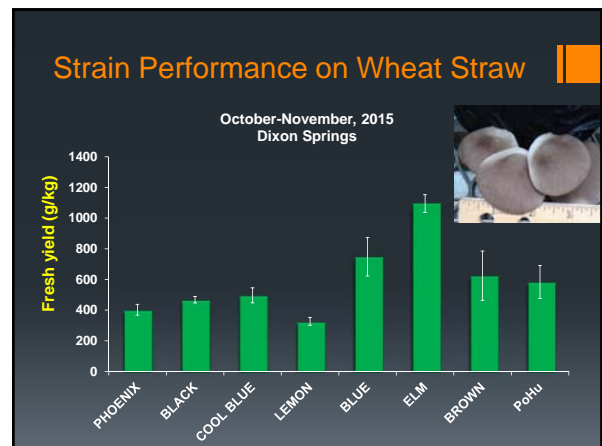
Italian (50-70F)

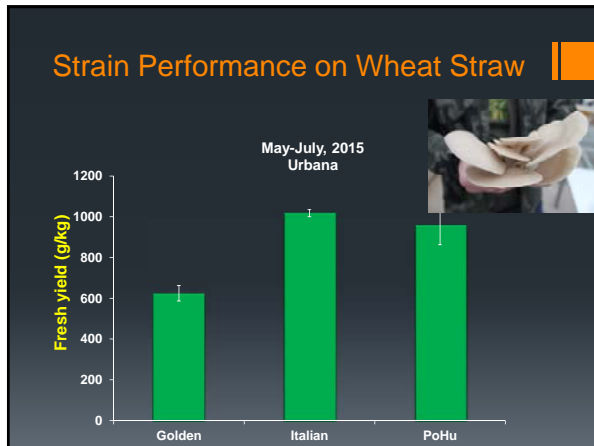


PoHu (55-85F)

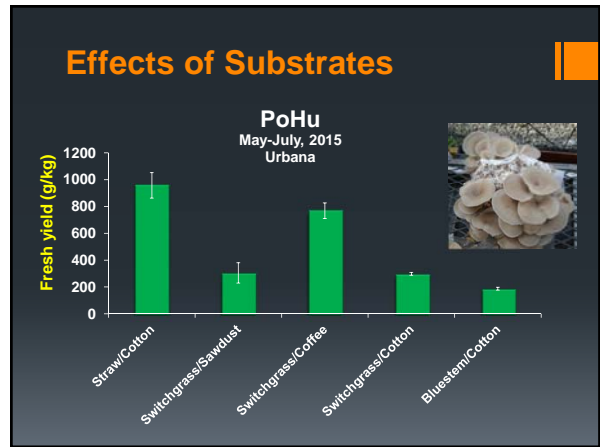


Elm (55-70F)





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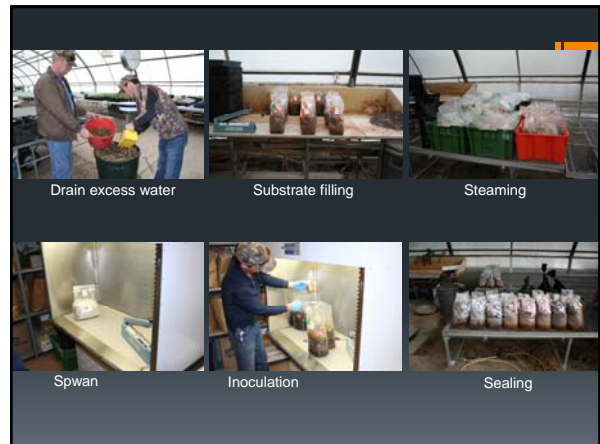


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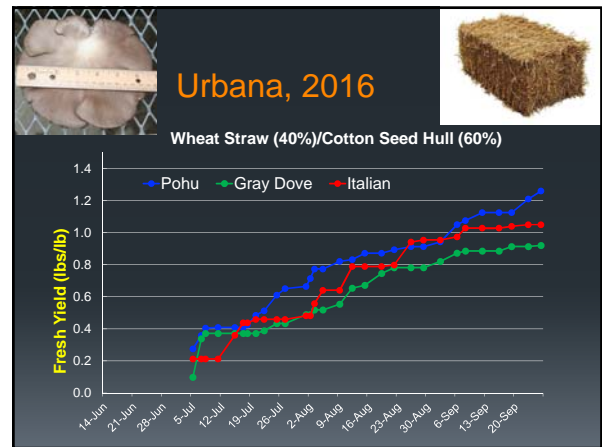
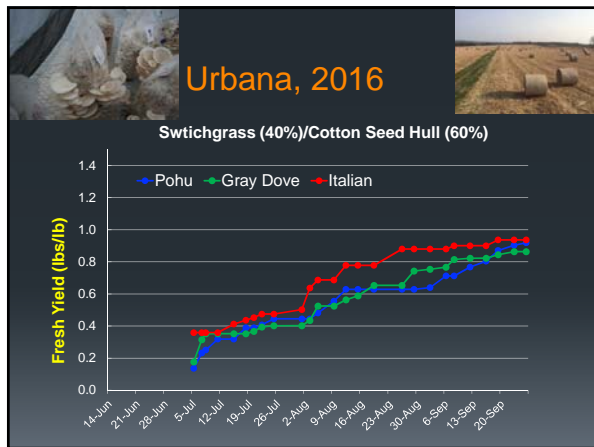
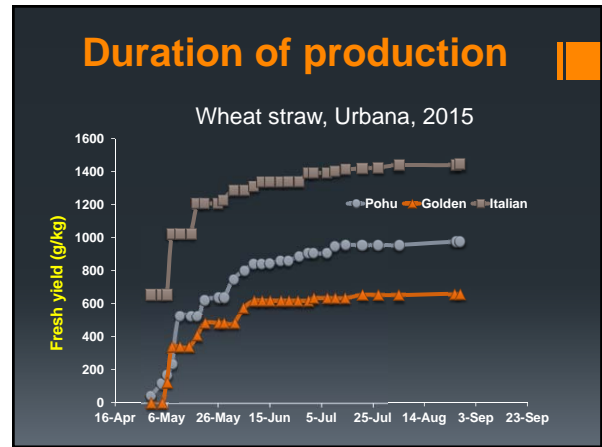
How to Grow?

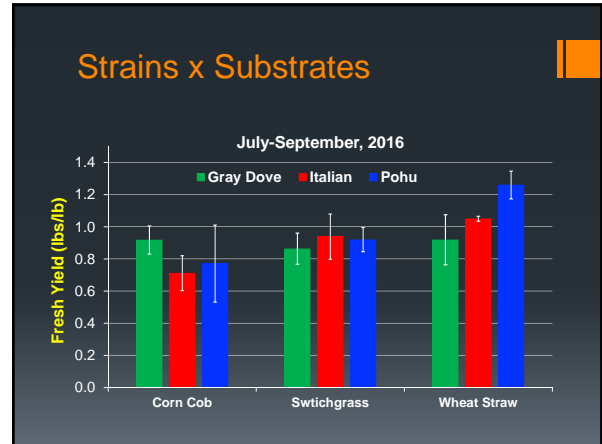
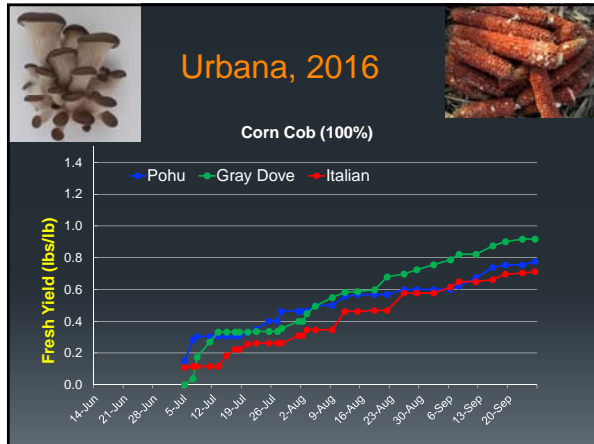
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U.S. Mushroom: Per capita use

Year	Fresh market	Processing ²	Total ³
	Pounds, fresh-equivalent		
1965	0.16	0.53	0.69
1970	0.28	0.98	1.26
1975	0.66	1.23	1.89
1980	1.20	1.53	2.73
1985	1.78	1.81	3.59
1990	1.99	1.70	3.69
1994	2.02	1.93	3.95
1995	2.02	1.74	3.76
1996	2.08	1.82	3.90
1997	2.30	1.65	3.95
1998	2.45	1.41	3.86
1999	2.48	1.58	4.06
2000	2.56	1.48	4.06
2001	2.59	1.35	3.94
2002 f	2.65	1.28	3.93
2003 f	2.67	1.25	3.92
Decade averages:			
1960s	0.24	0.79	1.03
1970s	0.64	1.3	2.02
1980s	1.70	1.65	3.35
1990s	2.13	1.70	3.83
2000s	2.60	1.38	3.98

f = ERS forecast.
² Fresh-weight basis.
 Source: Economic Research Service, USDA.

