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Editor
Mushroom Grower's Newsletter
The Mushroom Company
P.O. Box 5065
Klamath Falls, OR 97601

Dear Sir or Madam:

We at Flower City Mushrooms LLC were fortunate enough last year to receive funding from the Northeast Sustainable Agriculture Research and Education (NE SARE) organization to support research to increase production efficiency and promote adoption of organic king oyster mushrooms. This recently concluded project yielded positive results and it is our desire to share them with other growers. I have enclosed an executive summary of our report for your review and ask that you consider including this report or your summary of it in *Mushroom Grower's Newsletter*.

Please do not hesitate to contact me if additional information is needed.

Best regards,

John Morelli

A One Percent Solution

By John Morelli and Melissa Lamphron

With funding support from Northeast Sustainable Agriculture Research and Education, Flower City Mushroom LLC conducted a research project directed at *Increasing Production and Promoting Adoption of Organic King Oyster Mushrooms*. A benchmark for the success of this project was to be able to economically produce a pound or more of King Oyster mushrooms per six pounds of substrate within a five-week period. The strategy employed to accomplish this goal was to explore the efficacy of a variety of substrate formulations, using locally produced agricultural products and by-products containing constituents previously demonstrated by others to be effective in growing these mushrooms.

Using an analysis of fiber and protein content in a successful control formulation developed and published by Royse and Sanchez-Vazquez[1], six additional mixtures of ground corncobs, hardwood sawdust, wheat straw, wheat bran, soy meal, millet spent brewery grain, grape pomace and other supplements, were formulated to duplicate, and in two cases enhance, constituent content (See Table 1). Two complete mushroom crop cycles were conducted using these formulations. A third crop cycle was run with the most successful formulation, R7, and with modified versions of the three next best formulations, R2, R3 & R4.

	R1- Royse	R2 - Sawdust	R3 - Corncob	R4 - Wheat straw	R5 - 50% lignin increase	R6 - 35% lignin increase + 25% hemi-cellulose increase	R7 - Royse + 1% sucrose
Beet pulp				2.00			
Brewer's grain	15.00			8.80			14.90
Calcium carbonate	1.00	1.10	0.90	1.00			1.00
Corncob		7.60	57.10	26.50			
Grape pomace			14.60	13.60	20.60	5.10	
Millet	15.00		9.10				14.90
Sawdust	59.00	65.20	18.30	14.70	58.80	59.80	58.40
Soybean meal		9.80			1.00	0.90	
Sucrose							1.00
Wheat straw				33.40			
Wheat bran	10.00	16.30			19.60	34.20	9.90
	100.00	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.10**

Table 1. Substrate Formulations

While all ten formulations were productive, R7, which was simply the Royse formulation with the addition of 1% sucrose, clearly met and, in fact, surpassed the established benchmark by

[1] Royse, D. J., and J. E. Sanchez-Vazquez. 1999. Effect of brewer's grain and delayed release nutrient supplementation on yield and size of *Pleurotus eryngii* (king oyster mushroom). *In*: A. Broderick and T. Nair (eds.). *Mushroom Biology and Mushroom Products, Proceedings of the 3rd Int. Conf.* Sydney, Australia (CD-ROM). 362-367.

producing 1.3 pounds of mushrooms per five-pound block in just over four weeks. Beyond this measure of success, were evaluations of quality, compatibility with the ongoing farm operations, availability of local resources, and cost.

Quality was evaluated quantitatively as the "sellable" percentage of the harvested crop after removing deformities and other debris. With only one exception, quality measured greater than 90% and for the R7 formulation, 91.7%. Even with this approximately 8% reduction in overall harvest quantity, the sellable portion of R7 still exceeded the production and timeframe benchmarks for success. Additionally, the chefs of four top Rochester restaurants and the produce buyer for a large, local natural food store, performed qualitative evaluations. Evaluators were asked to assess the quality of the mushrooms based on size, weight, shape, texture, flavor, ease of preparation and culinary versatility. In every case, assessments were positive with several indicating the highest rating in every category.

Flower City Mushrooms LLC (FCM) began and continues to operate principally as a grower of Shiitake mushrooms. Compatibility with current operations was thus evaluated on the bases of synergetic and competitive relationships regarding materials, procedures, equipment, labor, and space. The similarity of needs in each of these categories led to a favorable evaluation in this regard and considerations regarding competition were easily outweighed by gains associated with a shorter production cycle for the King Oysters and the benefits of offering an expanded crop variety.

FCM was successful in identifying and establishing satisfying working relationships with additional local resources for substrate materials, including a microbrewery, primary log mill, organic seed producer, organic wheat straw farmer, and winery. Additionally, FCM's customers were pleased with the expanded selection and most have indicated a commitment to continue to purchase King Oyster mushrooms. FCM believes that development of strong local relationships and exchange of by-products is key to sustainability and is especially pleased to have succeeded in this regard.

Flower City Mushrooms Quality Survey

Please help us evaluate the quality of our ***King Oyster Mushrooms***. Fill in the questionnaire below and return to us next visit. Thanks, John & Melissa

Characteristic	Quality Low ---------- High	Comments
Taste	[ ] [ ] [ ] [ ] [ ]	
Size/Weight	[ ] [ ] [ ] [ ] [ ]	
Shape	[ ] [ ] [ ] [ ] [ ]	
Texture	[ ] [ ] [ ] [ ] [ ]	
Ease of Preparation	[ ] [ ] [ ] [ ] [ ]	
Culinary Versatility	[ ] [ ] [ ] [ ] [ ]	
Other_____	[ ] [ ] [ ] [ ] [ ]	
Other_____	[ ] [ ] [ ] [ ] [ ]	

Additional Comments: