

Evaluation of Soilless Media Used in Tobacco Float Systems¹

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INTRODUCTION

A wide range of soilless media is currently available to tobacco growers utilizing the float system for transplant production. Most of the media are predominantly made up of peat moss with varying amounts of perlite, vermiculite, and coconut fibers (coir). One of the most difficult problems for growers has been inconsistency in the media from year to year. Because peat is a natural product, some year to year variability is unavoidable. However, many manufacturers of soilless media have procedures in place to ensure that the final product is as consistent as possible.

To assist tobacco growers in evaluating soilless media, a program was begun in 1997 to test the performance of different brands of media under the same growing conditions. A sample bag of each medium was purchased from a local supplier and tested. Media were not

available in time for testing to be completed prior to the start of the plant production season. Due to the scope of these tests, individual lots of media may have varied significantly from these results.

The intent of this testing program is to establish a database on media performance over time that growers could use to guide their decisions in selecting soilless media. This report represents the first compilation of performance data from the media testing program.

MATERIALS AND METHODS

All media samples were obtained as unopened bags and were used directly from the bag with no added water. These tests were conducted at the UK College of Agriculture's Spindletop Research Farm, near Lexington, KY, in a 35 x 96 ft. greenhouse covered with a

¹The use of brand names in this publication does not imply an endorsement by the authors of the products named nor criticism of one not mentioned.

double layer of polyethylene. Heat was provided by vented natural gas furnaces and ventilation was automatically controlled with exhaust fans. The thermostat was set at 75°F with a 5°F set back at night. This generally kept the temperature from 70 to 85°F during the course of the tests.

Approximately three cubic feet of medium was placed into an automatic filler box (Berry Seeder Company, Elizabeth City, NC). The trays used were new, 242 cell polystyrene float trays. The first two trays filled with each medium were discarded and the next four were kept for the test. Samples of each medium were taken at tray filling to estimate the water content. The filled trays were seeded with pelleted burley tobacco seed (var. TN90). The trays were then floated on a water bed fertilized with 20-10-20 water soluble fertilizer at 100 ppm N. The trays were placed in the bed in a randomized complete block design with four replications. Seedling germination and spiral root incidence (% based on total number of cells) were evaluated 14 to 17 days after seeding. At approximately 7 weeks after seeding, the number of useable plants in each tray was estimated, by removing all plants that were judged to be of sufficient size and health to transplant. The seedlings were not clipped (mowed) during the test period.

RESULTS

Moisture contents of the bagged media ranged from 34 to 71% (Table 1). Burley Gold and Promix TA were generally on the dry end of the range with

< 50% moisture. The Southern States and Speedling mixes had higher moisture contents in the 55 to 60% range. Carolina Choice had the most consistent moisture content from year to year. The extremely high moisture contents > 70% were most likely due to improper storage of the media at the local dealer. The ideal moisture content for filling trays is around 50 to 55%. At this moisture, the media is moist enough to hold together and stay in the trays, but not so wet that it interferes with uniform filling.

Although, the moisture content of most media is fairly consistent when it leaves the factory, the moisture content of a particular bag depends greatly on the way in which it has been stored. Even though media comes in plastic bags, there are many holes in the bags. If stored for long periods in a hot, dry location, such as a greenhouse, media can dry out. If the media is too dry for tray filling, water can be added a day or two before seeding. A much more common problem is media which is too wet. A pallet of media is normally shrink wrapped for protection. Once a pallet has been opened, rain water can seep into the bags, especially bags near the bottom of the pile. Ideally, opened pallets of media should be stored in a shed or barn, or at least covered with a tarp. High moisture (> 55%) media does not flow well, can clog filler boxes, and increases the potential for compaction, since wet media compresses more easily than media at the proper moisture content.

For these tests, a cell was counted as germinated if there was a green leaf showing. Germination was nearly always greater than 90% and was consistently in the 94 to 96% range for most of the

media tested (Table 2). Burley Gold, Carolina Choice, Scotts, and Southern States media were consistently in the top group with regards to germination rates. Although other media had statistically significant lower germination rates, all had germination rates that would be acceptable in practice. Dry cells were not a problem, with an average of less than one dry cell per tray observed.

Many growers had a significant problem with spiral roots in the 1999 season. The incidence of spiral roots appears to be related to several factors, including media and environmental conditions. For example, the incidence of spiral root was much higher in the 1997 spring test than in the 1997 fall test (Table 3). Factors such as light intensity and evaporative demand have been suggested as possible contributors to high spiral root incidence, but their effects have not been confirmed. Burley Gold, Southern States and Scotts media were always in the group with the lowest incidence of spiral root. Speedling media consistently had higher spiral root incidence across all year/season tests.

The bottom line for most growers is the number of useable transplants they get per tray. A useable plant is one with sufficient size and health to survive transplanting. From a greenhouse, we should expect at least 90% useable plants. The useable plant percentages in these tests are lower, due in part to the fact that the plants were not clipped. Proper clipping promotes plant uniformity, and allows smaller plants a chance to catch-up. Had proper clipping procedures been employed, the number of useable plants probably would have been higher for all media. In the absence of clipping, the useable plant numbers reflect the

inherent uniformity of growth in the media tested (Table 4). The Jiffy product was the best in terms of number of useable plant produced for both seasons in which it was tested. This product has not been aggressively marketed, and has not been available in many areas of Kentucky. Burley Gold, Carolina Choice, Southern States, Scotts, and Sunshine have produced acceptable numbers of useable plants across the seasons tested. Speedling media in 1999 produced significantly fewer useable transplants, due in part to the high incidence of spiral root found in this medium.

CONCLUSIONS

Several commercially available media have performed in a relatively consistent manner over the course of this study. When using this information, however, it must be recognized that past performance is not always an indicator of how the current year's media will perform. Changes in performance from year to year may be due to differences in the light intensity and evaporative demand as well as changes made in formulating in the media. Regardless of the brand of media chosen, growers must continue to use good tray filling practices to avoid compaction.

Table 1. Moisture content (% water in moist media as sampled from the bag) at tray filling. Values in bold type are more than one standard deviation from the average.

	Year Tested			
Brand of Medium	1997 Spring	1997 Fall	1998 Spring	1999 Spring
Baccto Course ²			58	
Baccto Fine ²			71	
Burley Gold	42	43	49	
Carolina Choice	50	48	51	51
Jiffy Stronglite ³	47	50	58	
Promix TA			34	48
Scotts				63
Scotts w COIR			57	71
Southern States	56	56	56	66
Southern States w COIR				64
Speedling Unfortified	54	63	56	57
Speedling Fortified	59		54	55
Speedling Microplus				54
Sunshine LT3				44
Sunshine LT5	60	55	44	48
Average	53	53	53	56
Standard Deviation	7	7	9	9

2 No longer available

3 To be sold under the name AJiffy 915 Tobacco Mix@

Table 2. Percent germination 14 to 17 days after seeding

Brand of Medium	Year Tested			
	1997 Spring	1997 Fall	1998 Spring	1999 Spring
Baccto Course ²			93	
Baccto Fine ²			94	
Burley Gold	94**	95**	96**	
Carolina Choice	95**	92**	97**	96**
Jiffy Stronglite ³	90	95**	96**	
Promix TA			93	96**
Scotts				96**
Scotts w COIR			96**	96**
Southern States	92**	92**	96**	96**
Southern States w COIR				94
Speedling Unfortified	92**	89	96**	94
Speedling Fortified	94**		95**	93
Speedling Microplus				94
Sunshine LT3				94
Sunshine LT5	93**	91	94	95**
LSD 0.05	4	4	3	2
Test Average	93	92	95	95

** Indicates entries which were not significantly different at the 95% confidence level from the best entry within a year/season test.

² No longer available

³ To be sold under the name Jiffy 915 Tobacco Mix

Table 3. Spiral root (%) 14 to 17 days after seeding

Brand of Medium	Year Tested			
	1997 Spring	1997 Fall	1998 Spring	1999 Spring
Baccto Course ²			5	
Baccto Fine ²			3	
Burley Gold	8**	1**	2**	
Carolina Choice	6**	9	2**	4**
Jiffy Stronglite ³	9	3**	0**	
Promix TA			4	5**
Scotts				2**
Scotts w COIR			3	6**
Southern States	3**	1**	2**	3**
Southern States w COIR				4**
Speedling Unfortified	13	6	6	9
Speedling Fortified	15		3	12
Speedling Microplus				6**
Sunshine LT3				4**
Sunshine LT5	7**	6	3	4**
LSD 0.05	5	3	2	5
Test Average	9	4	3	5

** Indicates entries which were not significantly different at the 95% confidence level from the best entry within a year/season test.

2 No longer available

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Table 4. Usable plants (%) 7 weeks after seeding

Brand of Medium	Year Tested		
	1997 Fall	1998 Spring	1999 Spring
Baccto Course ²		77	
Baccto Fine ²		76	
Burley Gold	78	82	
Carolina Choice	71	78	81**
Jiffy Stronglite ³	84**	90**	
Promix TA		70	81**
Scotts			83**
Scotts w COIR		80	84**
Southern States	80**	82	85**
Southern States w COIR			83**
Speedling Unfortified	75	81	68
Speedling Fortified		81	63
Speedling Microplus			68
Sunshine LT3			80
Sunshine LT5	74	82	82**
LSD 0.05	6	4	4
Test Average	77	80	78

** Indicates entries which were not significantly different at the 95% confidence level from the best entry within a year/season test.

² No longer available

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