Seeding Rate x Cultivar Evaluations in Twin Row Pattern

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Introduction

Peanut farmers must take many variables into consideration when developing a strategy for producing the best crop. Maximized net profit, high yield and grade, and minimized pest incidence are extremely important in achieving optimal results. However, adjustment of agronomic variables can influence any or all of these factors, sometimes improving one aspect while harming another. When tomato spotted wilt virus (TSWV) became a serious threat to Georgia peanut production in the early 1990s, one recommended adjustment for growers was to increase seeding rate to 6 seed/ft of row. This was to ensure a final plant stand of 4+ plants/ft of row, which is a critical level in reducing TSWV incidence. However, increased plant stand also increases potential spread of other diseases, such as white mold (*Sclerotium rolfsii*). As new peanut cultivars with improved resistance to diseases are released, the question looms as to whether seeding rate can be reduced without affecting yield or a major disease outbreak. This could have a significant impact on seed cost per acre, especially since most new cultivars on the market have larger seed size (570-700 seed/lb) than cultivars like 'Florunner' (750 seed/lb) or 'Georgia Green' (850 seed/lb), which have dominated planted acreage for over 30 years.

Research has shown that twin rows have an advantage over single rows in terms of yield and occurrence of most major peanut diseases. Recommended seeding rates are the same regardless of whether planting in single or twin rows (6 seed/ft in singles = 3 seed/ft/twin [SPFT] in twin row pattern) to achieve the same plant population (87,120 seed/A). Some farmers have the philosophy that higher seeding rates should be used in twin row patterns than 3 SPFT. However, previous research in 1999-2000 on 'C-99R' and in 2007 on 'Georgia-03L' has shown equivalent or reduced yields at seeding rates higher (4 SPFT) and lower (2 SPFT) than recommended.

Materials and Methods

Experiments took place at the Southeast Georgia Research and Education Center in Midville, GA and at the Attapulgus Research and Education Center in Attapulgus, GA in 2008. Four cultivars (Georgia Green, 'AT 3085RO', 'Tifguard', and 'Georgia-06G') and four seeding rates (2.2, 2.6, 3.1, and 3.5 SPFT) were planted in long plots of 6 ft x 340 ft using a split plot design with cultivar as main plot treatment and seeding rate as the sub-plot effect on 28 May 2008 at Midville. Eight cultivars (four medium-maturity [135 d] – Georgia Green, Tifguard, Georgia-06G, and Florida-07; four late-maturity [150 d] – 'York', 'Georgia-02C', 'Georgia-01R', and C-99R) and five seeding rates (2.6, 3.1, 3.5, 4.1, and 4.4 SPFT) were planted in 6 ft x 50 ft plots in a group-balanced block split-plot design with cultivar as main plot effect and seeding rate as the sub-plot effect on 14 May 2008 in Attapulgus. Four replications were used at both locations.

Management was similar at both locations. A twin row vacuum planter (Monosem Inc., Edwardsville, KS 66111) was used to plant seed at a depth of 2.25 inches. Thimet at 6 lb/A (phorate @ 1.2 lb ai/A) was applied in-furrow at planting. Applications of 1 qt/A Prowl (pendimethalin @ 0.83 lb ai/A), 0.44 oz/A Strongarm (diclosulam @ 0.023 lb ai/A), and 3 oz/A Valor (flumioxazin @ 0.096 lb ai/A) were applied within 24 hours of planting and irrigated with 0.5-0.75 inches of water for weed control. University of Georgia (UGA) extension recommendations were followed for all remaining management practices.

Data were subjected to analysis of variance and Fisher's protected least significant difference test.

Results and Discussion

It was observed that incidences of TSWV and white mold at the Midville location were very low, so no disease ratings were obtained. No interactions between seeding rate and cultivar occurred for any of the evaluated factors (yield, grade, and plant stand). There were no yield differences among seeding rates at Midville (Table 1), but there were differences in total sound mature kernels (TSMK) and plant stands. The 2.6 SPFT seeding rate had higher grade than the 2.2 and 3.5 SPFT rates, and the two higher seeding rates had greater plant stands at harvest than the two lower seeding rates. However, only the 2.2 SPFT rate was below the recommended final plant stand of 4.0 seed per foot. Cultivar differences were observed for all three evaluated factors, and Georgia-06G had best results in all categories (Table 2). Georgia Green, Tifguard, and AT 3085RO were equal in yield and grade, but Georgia Green did have the lowest plant stand of all the cultivars.

Table 1. Peanut response to seeding rates when planted in twin rows, Midville, GA, 2008[a].

Seeding Rate (seed per foot per twin)	Yield (lb/A)	TSMK[b] (%)	Plant Stand Harvest (plants/foot)
2.2	6078	77.4	3.8
2.6	6119	78.2	4.0
3.1	6039	77.9	4.5
3.5	5913	77.5	4.7
level P	NS	0.055	0.001
LSD		0.53	0.46

[a] Averaged over four replications and four peanut cultivars.
[b] TSMK = total sound mature kernels

Table 2. Yield, grade, and plant stand for peanut cultivars planted in twin rows, Midville, GA, 2008[a].

Cultivar	Yield (lb/A)	TSMK[b] (%)	Plant Stand Harvest (plants/foot)
Georgia Green	5689	77.3	3.8
AT 3085RO	5951	76.8	4.4
Tifguard	5864	77.1	4.3
Georgia-06G	6644	79.7	4.4
level P	0.002	0.026	0.049
LSD	406.6	1.92	0.43

[a] Averaged over four replications and four seeding rates.
[b] TSMK = total sound mature kernels

Similar to Midville, there were no interactions between seeding rate and cultivar at Attapulgus, and there were also no differences in yield, grade, or TSWV among seeding rates (Table 3). Even though there were statistically more plants at harvest for the rates above current UGA recommendations (3.5, 4.1, and 4.4 SPFT), the 2.6 and 3.1 SPFT seeding rates were still above the 4 plants/ft threshold. Despite fairly low levels of white mold overall, there was more present in the 3.1 SPFT recommended rate than in the 2.6 or 3.5 SPFT. Cultivar differences were evident for all tested variables (Table 4). There were some very obvious trends when comparing medium-maturity peanuts with late-maturity peanuts. As a group, medium-maturity peanuts had higher yields, better plant stands, and less TSWV and white mold. Florida-07 had outstanding yields, but was lowest of all cultivars in terms of grade. Georgia-06G was statistically among the best performing cultivars in all categories.

Table 3. Peanut response to seeding rates when planted in twin rows, Attapulgus, GA, 2008[a].

Seeding Rate (seed per foot per twin)	Yield (lb/A)	TSMK[b] (%)	Plant Stand Harvest (plants/foot)	TSWV[c] (%)	White Mold (%)
2.6	6410	75.1	4.3	5.2	3.9
3.1	6355	74.5	4.8	4.3	7.5
3.5	6499	75.0	5.3	4.8	4.6
4.1	6514	74.5	5.3	4.4	6.0
4.4	6494	74.6	5.5	4.5	5.3
level P	NS	NS	0.0001	NS	0.02
LSD			0.27		2.3

[a] Averaged over four replications and eight peanut cultivars.
[b] TSMK = total sound mature kernels
[c] TSWV = tomato spotted wilt virus

Table 4. Yield, grade, plant stand, tomato spotted wilt virus (TSWV), and white mold incidence for peanut cultivars planted in twin rows, Attapulgus, GA, 2008[a].

Cultivar	Yield (lb/A)	TSMK[b] (%)	Plant Stand Harvest (plants/foot)	TSWV (%)	White Mold (%)
Georgia Green	6810	75.4	5.4	4.9	3.8
Tifguard	6973	77.4	5.6	0.9	2.7
Georgia-06G	6970	75.9	5.9	1.5	2.2
Florida-07	7586	71.9	5.6	2.3	3.4
York	5718	71.1	3.9	5.2	6.7
Georgia-02C	5744	76.3	5.3	6.6	7.7
C-99R	5569	73.9	4.4	7.1	9.8
Georgia-01R	6265	75.9	4.4	8.6	7.4
level P	0.0001	0.0001	0.0001	0.0001	0.025
LSD	223.2	1.32	2.92	3.19	4.76

[a] Averaged over four replications and five seeding rates.
[b] TSMK = total sound mature kernels

Summary

This data supports results seen in other research where yields, grade, and disease incidence are not improved by increasing seeding rates above UGA recommendations. Despite the fact that final plant stands were increased at higher seeding rates, rates as low as 2.6 SPFT still resulted in final plant stands above the recommended baseline of 4 plants/ft of row at both locations. Coupled with statistically equal or better results in yield, grade, and TSWV and white mold incidence, this data would suggest that a reduced seeding rate of 2.6 SPFT is adequate for planting new disease resistant cultivars without adverse effects. This would reduce seed costs for the grower, allowing more potential for maximized net returns.

Note – mention of trade names in this article is for informational purposes only and does not constitute endorsement by the University of Georgia.