Response of Two Virginia Market Type Peanut Cultivars to Planting and Digging Dates in North Carolina

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Virginia market type peanut (*Arachis hypogaea* L.) cultivars often vary in the length of time required to reach optimum pod maturity. The cultivars CHAMPS (Mozingo et al., 2006) and Perry (Isleib et al., 2003) can vary by as many as 9 days from emergence to when the first visible pod on a plant shows natural coloration of the testa (Balota et al., 2015; Boote, 1982). Both planting date and the timing of digging pods and inverting peanut vines can affect economic value of peanut (Jordan, 2019). In this brief we discuss differences in economic value of two cultivars grown in North Carolina across a range of planting and digging dates.

The experiment was conducted from 2009-2012 near Lewiston-Woodville, NC (36.07N, -77.11W) at the Peanut Belt Research Station in conventional tillage systems on a Norfolk loamy sand soil. The cultivars CHAMPS and Perry were planted approximately May 5, May 20, and June 8 during each year, and peanut for each planting date was dug approximately September 8 and 20 and October 7 and 20. Peanut was harvested within 7 days after digging and dried to 8% moisture. Economic value was determined as the product of yield and the monetary contribution of market grade components for Virginia market type peanut.

Peanut was not irrigated during May and June but was irrigated with overhead sprinklers during July, August, and September. The experimental design was a split plot with planting date serving as whole plot units and combinations of cultivars and digging dates serving as sub-plot units. Treatments were replicated 4 times. Combinations of digging date and cultivar were randomized within each planting date block. Data for economic value were subjected to analysis of variance using the PROC GLM procedure (SAS Institute, Cary, NC) for a 4 (year) × 2 (cultivar) × 3 (planting date) × 4 (digging date) factorial treatment arrangement. Means of significant main effects and interactions were separated using Fisher's Protected LSD ($p \leq 0.05$). Liner and quadratic functions for economic return versus days after emergence and heat unit accumulation (base temperature of 56 F) were tested using means for the significant interactions involving digging dates.

Interactions of planting date × cultivar, year × planting date, planting date × digging date, and cultivar × digging date were significant for economic value ($p \leq 0.05$). The interaction of year × planting date × cultivar × digging date was not significant. Economic value was greater for the cultivar CHAMPS when planted May 20 compared with planting on June 8; economic value from planting May 5 and June 8 was similar (Table 1). Economic value was similar for the cultivar Perry when planted in May and exceeded that of planting in June. When pooled over cultivars and digging dates, economic value was similar when peanut was planted May 5 or May 20 in all years (Table 2). Planting in June resulted in lower economic value compared with May plantings in 3 of 4 years. In 2012, greater economic value was noted when peanut was planted in June compared with the early May planting. Greater economic value for June-planted peanut in 2012 may have been a result of limited rainfall during June (Table 2). Peak flowering often occurs in June when peanut is planted in early to mid-May. Peanut planted in June was growing

vegetatively during the period of drought while reproductive growth of peanut planted in May most likely was affected adversely by this period of drought. Lower economic value was noted when peanut was dug September 8 regardless of planting date when compared to at least one of the later digging dates (Table 3). The greatest economic value was observed when peanut was dug September 20, October 7, and October 20 at planting dates of May 5, May 20, and June 8, respectively. Quadratic ($Y = 139.9x – 0.54x^2 – 7889$, $r^2 = 0.98$, $p = 0.0187$), linear ($Y = 12.6x - 576$, $r^2 = 0.87$, $p = 0.0661$), and linear ($Y = 9.6x – 1983$, $r^2 = 0.72$, $p = 0.1563$) functions for economic value versus days after emergence were noted for these respective planting dates (data not shown). Linear and quadratic functions were not significant for economic value versus heat unit accumulation for early and late planting dates ($p = 0.2647$ to 0.3499) while a linear function was significant when peanut was planted May 20 ($Y = 1.41x – 2663$, $r^2 = 0.98$, $p = 0.0048$) (data not shown). Economic value of the later-maturing cultivar Perry was greatest when dug October 20 while the greatest economic value for the early maturing cultivar CHAMPS was noted on October 7 (Table 4). When pooled over years and planting dates, fewer heat units were needed for CHAMPS to reach optimum economic value compared with Perry. Quadratic functions of $Y = 88.1x – 0.30x^2 – 5302$ ($r^2 = 0.98$, $p = 0.0180$) and $Y = 125.8x – 0.46x^2 – 7456$ ($r^2 = 0.97$, $p = 0.1187$) for economic value versus days after emergence for these respective cultivars (data not shown). Linear functions were significant for economic value versus heat unit accumulation for CHAMPS ($Y = 1.25x – 2286$, $r^2 = 0.88$, $p = 0.0416$) and Perry ($Y = 1.49x – 2917$, $r^2 = 0.98$, $p < 0.0001$) (data not shown).

These results indicate that planting date and digging date can interact with year and cultivar to affect economic value of peanut. As expected, when planting was delayed digging at optimum maturity required a delay. However, the earlier-maturing cultivar CHAMPS required a

shorter delay than Perry. These data can be used as examples of how cultivars with a wide range of pod maturity may respond to planting and digging dates in North Carolina. Estimated economic value for peanut planted May 20 were equal to or greater than economic value when peanut was planted in early May or early June. These results are consistent with previous findings in North Carolina demonstrating that planting peanut in mid- to late-May often results in the greatest yield (Jordan, 2019).

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Citations

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Table 1. Influence of planting date and cultivar on economic value of peanut.†

		Economic value	
		Cultivar	
Planting date	Heat unit accumulation	CHAMPS	Perry
	growing degree days	$/acre	
May 5	2813	939 ab *	1021 a
May 20	2599	988 a	1017 a
June 8	2332	857 b	820 b

†Means for economic value within a cultivar followed by the same letter are not significantly different according to Fisher's Protected LSD test at $p \leq 0.05$. * indicates significance between cultivars within a planting date. Data are pooled over years and digging dates.

Table 2. Influence of year and planting date on economic value of peanut. †

		Economic value		
		Planting date		
Year	Rainfall in June	May 5	May 20	June 8
	inches	$/acre		
2009	5.2	1349 a	1378 a	1035 b
2010	2.3	926 a	971 a	748 b
2011	4.3	798 a	723 a	453 b
2012	0.1	846 b	1039 ab	1119 a

†Means for economic value within a year followed by the same letter are not significantly different according to Fisher's Protected LSD test at $p \leq 0.05$. Data are pooled over cultivars and digging dates.

Table 3. Influence of planting date and digging date on economic value of peanut. †

	Heat unit accumulation			Economic value		
	Planting date			Planting date		
Digging date	May 5	May 20	June 8	May 5	May 20	June 8
	growing degree days			$/acre		
Sep 8	2557	2358	2123	764 c	646 c	391 c
Sep 20	2778	2583	2321	1071 a	974 b	740 c
Oct 7	2924	2710	2429	1118 a	1194 a	1063 b
Oct 20	2993	2756	2460	967 b	1202 a	1161 a

†Means for economic value within a planting date followed by the same letter are not significantly different according to Fisher's Protected LSD test at $p \leq 0.05$. Data are pooled over years and cultivars.

Table 4. Influence of cultivar and digging date on economic value of peanut. †

		Economic value	
		Cultivar	
Digging date	Heat unit accumulation	CHAMPS	Perry
	growing degree days	$/acre	
Sep 8	2342	608 d	593 d
Sep 20	2561	930 c	926 c
Oct 7	2688	1132 a	1116 b
Oct 20	2736	1039 b	1180 a

†Means for economic value within a cultivar followed by the same letter are not significantly different according to Fisher's Protected LSD test at $p \leq 0.05$. Data are pooled over years and planting dates.