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Effect of Cultivars and Field Traffic on the Fruiting Patterns of Virgina Type Peanuts[1]

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ABSTRACT

Knowledge of the fruiting patterns of peanuts (*Arachis hypogaea* L.) is useful in determining the most feasible band widths for pesticides and other amendments, designing new peanut equipment and adapting new production practices for specific cultivars. The fruiting patterns and the effect of field traffic on these patterns were determined on five large-seeded Virginia type peanut cultivars with variant growth habits.

Cultivars differed in fruiting patterns with the bunch growth type having a significantly higher percentage of their pods near the taproot than the runner types. The bunch types, NC 17 and NC-FLA 14 had 73.5 and 66.5% of their total fruit within a 13-cm wide section centered over the taproot whereas, the runners, VA 72R and Florigiant, and the intermediate type, NC 5, had 42.8, 45.5 and 45.3%, respectively, in a similar position. At the 0.05 level of probability, field traffic had no significant effect on the fruit distribution of the bunch cultivars, but NC 5, VA 72R and Florigiant (at 0.10 level) produced significantly less fruit on the side of the row subjected to field traffic during the fruiting season.

Key Words: *Arachis hypogaea* L., groundnuts, growth habit, cultivar, field traffic, fruiting distribution.

Literature on the fruiting characteristics of peanuts (*Arachis hypogaea* L.) with respect to the lateral fruiting distance from the taproot is limited. Knowledge of the fruiting patterns of peanuts is useful in determining band widths for pesticides and other amendments, designing new equipment and adapting new production practices for specific cultivars.

General observations have indicated that bunch growth types produce a higher percentage of peanuts immediately around the taproot than do runner growth types. Wright and Steele (1) working with the runner growth type Virginia 61R cultivar, found the percentage of total peanuts decreased with distance from the taproot. Gupton et al. (2) found the order of fruit placement to be related to the branching pattern of Virginia type peanuts with pegs occurring initially on the first reproductive branch of the cotyledonary lateral and successive pegging extending outward and upward in concentric circles from the first inflorescence on the lateral. This investigation was conducted to determine how the distribution of peanuts varied among selected large-seeded Virginia type runner and bunch cultivars. The effect of field traffic on the fruiting patterns was investigated also.

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Materials and Methods

Five large-seeded Virginia type peanut cultivars were grown in 1969 and 1970 in the bi-state peanut variety and quality evaluation trials in North Carolina and Virginia using recommended production practices. Soil types varied from a Norfolk FS Deep Phase (Typic Paleudult; fine-loamy, siliceous, thermic) to a Duplin FSL (Aquic Paleudult; clayey, kaolinitic, thermic). A total of eight determinations were obtained for each cultivar (one determination per location per year per cultivar). Of the five cultivars grown, Florigiant and VA 72R have a runner growth habit, NC 5 is intermediate although its tendency is more toward runner, and NC 17 and NC-FLA 14 have a bunch growth habit.

The lateral fruiting distributions were measured for each determination by digging the peanuts at maturity. A 91 by 91-cm metal frame divided into 7 sections, each 13 by 91-cm, with removable sheet metal partitions was placed with the center section over the taproots of the plants parallel with the row direction. The frame was always positioned so that the left side was subjected to field traffic during pesticide applications. Removal of peanuts from the soil was accomplished by digging to a depth of 18-cm with a sheet metal scoop for each of the seven sections. The soil was screened through 0.64-cm hardware cloth with vines and foreign material removed by hand.

The peanuts from each section were placed in metal quart cans, weighed and dried in an oven for 3 days at a temperature of 82 C for determination of moisture content. The percentage of fruit by weight for each section was calculated to determine the distribution. This procedure is the same as described by Wright and Steele (1).

All data were statistically analyzed using Duncan's New Multiple Range Test at the 0.05 level.

Results and Discussion

The average lateral fruiting distributions of the five cultivars over a 2-year period are shown in Table 1. Florigiant produced 45.5% of its fruit in the center 13-cm section, 37.6% in the two adjoining sections and 14.5% in the next two sections. VA 72R and NC 5 followed a similar pattern except that slightly less fruit were produced in the center section and a few more fruit in the two adjoining sections. These cultivars produced some fruit in all sections across the entire 91-cm row. Conversely, NC-FLA 14 and NC 17 produced 66.5 and 73.5%, respectively, of their fruit in the section around the taproot, followed by 31.5 and 24.9% respectively, in the two adjoining sections. Almost no fruit were produced in sections more than 19.5 cm from the taproot.

Florigiant and VA 72R produced approximately 83% of their total fruit within a lateral distance of 39-cm centered over the row (center three sections). NC 5 had 90% in these sections and NC 17 and NC-FLA 14 each produced 98% of their total fruit within the same lateral distance. These groupings differed significantly (0.05 level) in percentage of fruit in the center three sections. Florigiant and VA 72R are true runner growth types, whereas NC 5 is a semi-runner/semi-bunch (intermediate growth type)

Table 1. Average Lateral Fruit Distribution of Cultivars Across 91-cm Row by Sections.

Cultivars	Section 1/ 1	2	3	4	5	6	7
	----------%----------						
Florigiant	.5a*	6.0a	17.1ab	45.5b	20.5a	8.5a	2.0a
VA 72R	.2ab	5.4a	18.6a	42.8b	22.3a	9.1a	1.7a
NC 5	.1b	3.4ab	19.2a	45.3b	24.7a	6.9a	.4a
NC 17	.0b	.8b	12.1b	73.5a	12.8b	.8b	.0b
NC-FLA 14	.0b	1.1b	16.6ab	66.5a	14.9b	1.0b	.0b

1/ Each section is 13-cm wide with section 4 centered over the plant taproot; section 1 being nearest the tractor wheel and section 7 having no wheel traffic.

* Duncan's New Multiple Range Test as the 0.05 level. Means are comparable only within the same section across cultivars. Means sharing the same letter are not statistically different.

and NC 17 and NC-FLA 14 are true bunch growth types. The statistical analyses of the percentage of pods within the center three sections support these classifications of cultivars by growth type. The percentage of fruit which occurred in the center five sections of the row further justified the classifications of these cultivars. The bunch-type cultivars NC 17 and NC-FLA 14 had all their fruit in this area, whereas the intermediate growth type, NC 5, and the runner growth types, Florigiant and VA 72R, had a small proportion of their fruit outside of the five central sections.

The effect of field traffic on the fruiting distribution by cultivars is shown in Table 2. Only the left side of the row was subjected to field traffic by ground equipment. There was no statistical difference (0.05 level) in the fractional amount of fruit obtained from the two sides of the row of the bunch type cultivars NC 17 and NC-FLA 14. No differences were expected for these bunch types since they grow upright and tractor wheel damage to their vines was minimal. However, runner growth cultivars, except Florigiant (although significant at 0.10 level) and the intermediate growth habit cultivar had significantly (0.05 level) less fruit on the side of the row exposed to traffic.

Table 2. Fruit Distribution on Traffic versus No Traffic Side of Row by Cultivars and Growth Habits.

Cultivars	Growth Habit	Side of Row: Traffic	No Traffic
		----------%----------	
Florigiant	Runner	46.3 a*	53.7 a
VA 72R	Runner	45.6 b	54.4 a
NC 5	Intermediate	45.3 b	54.6 a
Mean		45.8 b	54.2 a
NC 17	Bunch	49.6 a	50.4 a
NC-FLA 14	Bunch	50.9 a	49.1 a
Mean		50.3 a	49.7 a

* Duncan's New Multiple Range Test at the 0.05 level. Means are comparable only across row sides within cultivars or growth habit means. Means sharing the same letter are not statistically different.

The moisture content (% wet basis) of the fruit distributed across the 91-cm row for all cultivars at digging time is shown in Figure 1. As the distance from the taproot (row center) increased, the moisture content of the fruit increased. These data indicate that the most mature peanuts are around the taproot and that the proportion of mature peanuts decreased as the distance from the taproot increases. This concurs with Sharon's (3) findings that the moisture content of peanut kernels increased up to the 7th week underground and then fell continously as the peanuts matured.

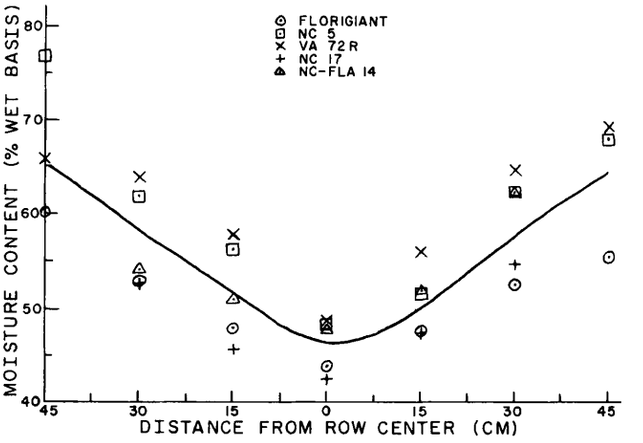

Fig. 1. Moisture content of peanuts distributed across a 91-cm row.

Conclusions

Bunch and runner growth type cultivars had different fruiting patterns. Moisture contents of the fruits were directly proportional to their distance from the taproot. Based on moisture content, the most mature fruits occurred directly around the taproot. Field traffic affected the distribution patterns obtained from runner and intermediate growth type cultivars but had no effect on the bunch type cultivars. This data could be used to establish the most feasible band widths for landplaster and pesticide applications among cultivars with variant growth habits.

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