College of Agricultural & Environmental Sciences
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Influence of Application Volume and Droplet Size on Spray Penetration into Peanut Canopy

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Introduction

- Peanut production in Southeast United States greatly affected by diseases and pests
- Heavily rely on use of pesticides
- Timely and effective pesticide application is critical

Late Leaf Spot in Peanut

Thrips attack in Peanut

Palmer Amaranth in Peanut

Spray Application Parameters

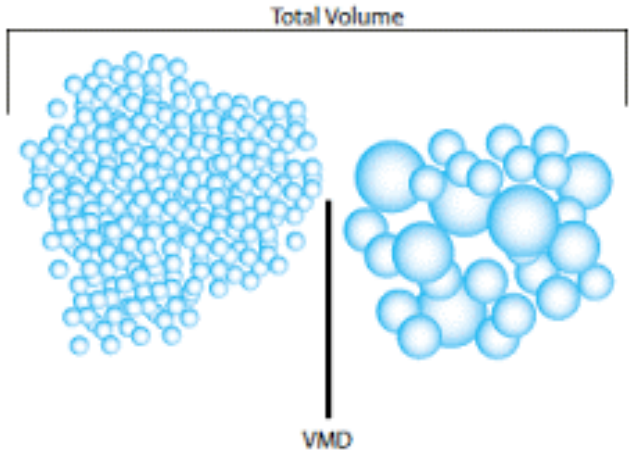
Nozzle Selection

XRC

AIXR

TTI

Droplet Size



Category	Symbol and color code	Approximate VMD (µm)
Extremely fine	XF	<60
Very fine	VF	61-144
Fine	F	145-235
Medium	M	236-340
Coarse	C	341-403
Very coarse	VC	404-502
Extremely coarse	XC	203-665
Ultra coarse		>665

Ground Speed

GPA 18"

5 mph	6 mph	7 mph	8 mph	9 mph	10 mph	12 mph	14 mph
7.3	6.1	5.2	4.5	4.0	3.6	3.0	2.6
8.6	7.2	6.1	5.4	4.8	4.3	3.6	3.1
9.9	8.3	7.1	6.2	5.5	5.0	4.1	3.5
11.2	9.4	8.0	7.0	6.2	5.6	4.7	4.0
11.9	9.9	8.5	7.4	6.6	5.9	5.0	4.2
13.2	11.0	9.4	8.3	7.3	6.6	5.5	4.7
13.9	11.6	9.9	8.7	7.7	6.9	5.8	5.0
15.2	12.7	10.8	9.5	8.4	7.6	6.3	5.4
9.2	7.7	6.6	5.8	5.1	4.6	3.9	3.3

Application Volume

Recent Trends - Pesticide Application in Peanut

- **Lower Application Volumes** – trend towards using lower volumes to be more efficient and cover more acres

- **Larger Droplets** – increased use of nozzles that produce larger droplets due to spray drift concerns

Objective

To evaluate the influence of application Volume and droplet size on spray penetration into peanut canopy

Site and Planting Information

Study Year: 2021

Location: Lang Farm (Tifton, GA)

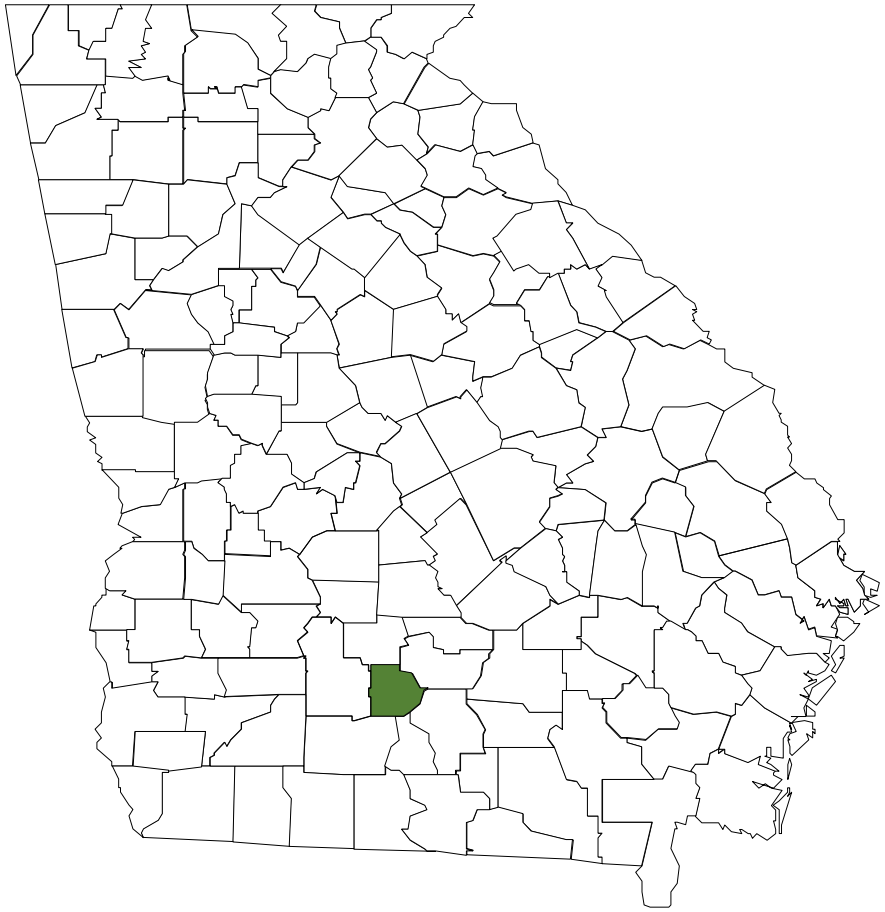
Field Conditions: Conventional, Irrigated

Cultivar: GA-06G

Seeding Rate: 87,500 seeds/ac

Planting Date: May 25, 2021

Management: As per recommendations outlined in UGA Peanut Production Guide



(UGA Tifton Campus, Tift County, Southwest GA)

Study Treatments

Three Spray Volumes:

(by varying nozzle size)

- 10 GPA
- 15 GPA
- 20 GPA

Three Droplet Sizes:

(by varying nozzle type)

- Medium
- Very Coarse
- Ultra Coarse

Standard Flat-fan (XR)

Air Induction (AIXR)

Turbo TeeJet Induction (TTI)

Plot Size: 4-row plots (12 ft. x 80 ft.)

Sprayer: 6-row sprayer with a rate controller

Design: Randomized Complete Block (3 replications)

Fungicidal Application: Total six fungicide applications

- *Chlorothalonil @16 oz/ac at 47, 62, 75, 92 & 122 DAP*
- *Tebuconazole @7.2 oz/ac at 62, 75, 92, 106 DAP*

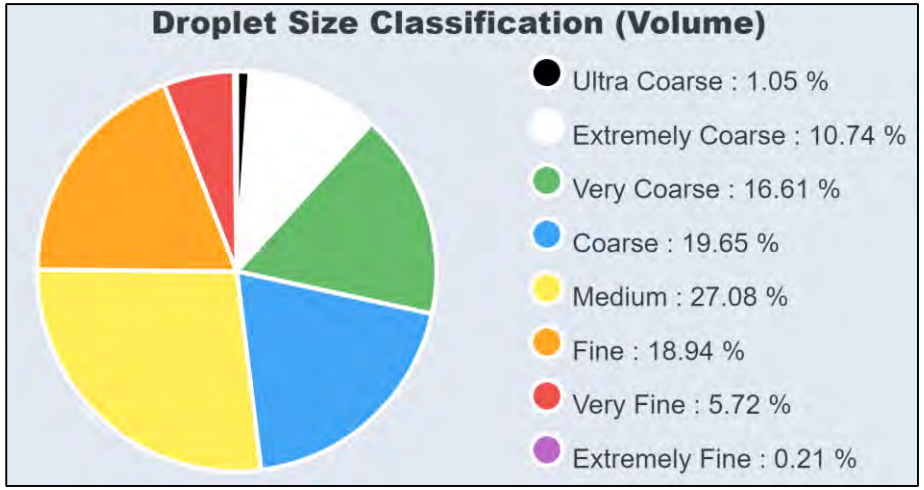
Data Collection (2021)

- Coverage and canopy penetration
  - Water sensitive papers
  - Top, middle & bottom of the canopy
- Canopy measurements & leaf area index (LAI)
  - LAI - using ceptometer (AccuPAR LP-80)
- Disease rating (Leaf spot at 90 and 120 DAP and White Mold at 120 DAP)
- Yield (harvesting center two rows for each plot)

Data Analysis (2021)

Analysed Area	23.91 cm²	Applied Volume on Paper	0.09 µl/cm²	Quantity of Drops	566
Diameter Variation Coefficient	60.52%	VMD	272.73 µm	D0.9	398.38 µm
Largest Drop	450.20 µm	Average Diameter	146.56 µm	Covered Area	2.34%
Density	23.67 drops/cm²	Relative Amplitude	0.81	Drift Potential	2.18%
D0.1	176.72 µm	NMD	146.56 µm	Smallest Drop	24.34 µm
Droplet Size Classification	Medium				

Data were analyzed using analysis of variance and means comparison using student t-test using *p≤0.10 in JMP Pro 16 (SAS Institute, NC).*



Canopy Measurements (2021)

Date	DAP*	Height (cm)	Width (cm)	Area (cm^2)	LAI*
July 11	47	23.9 d	42.9 d	1031.2 d	0.56 c
July 26	62	34.7 c	68.0 c	2386.6 c	0.82 c
Aug. 25	92	45.8 a	83.5 a	3833.6 a	4.45 a
Sept. 24	122	41.7 b	82.0 b	3415.2 b	3.50 b

***DAP means days after planting and LAI means Leaf Area Index.**

47 DAP

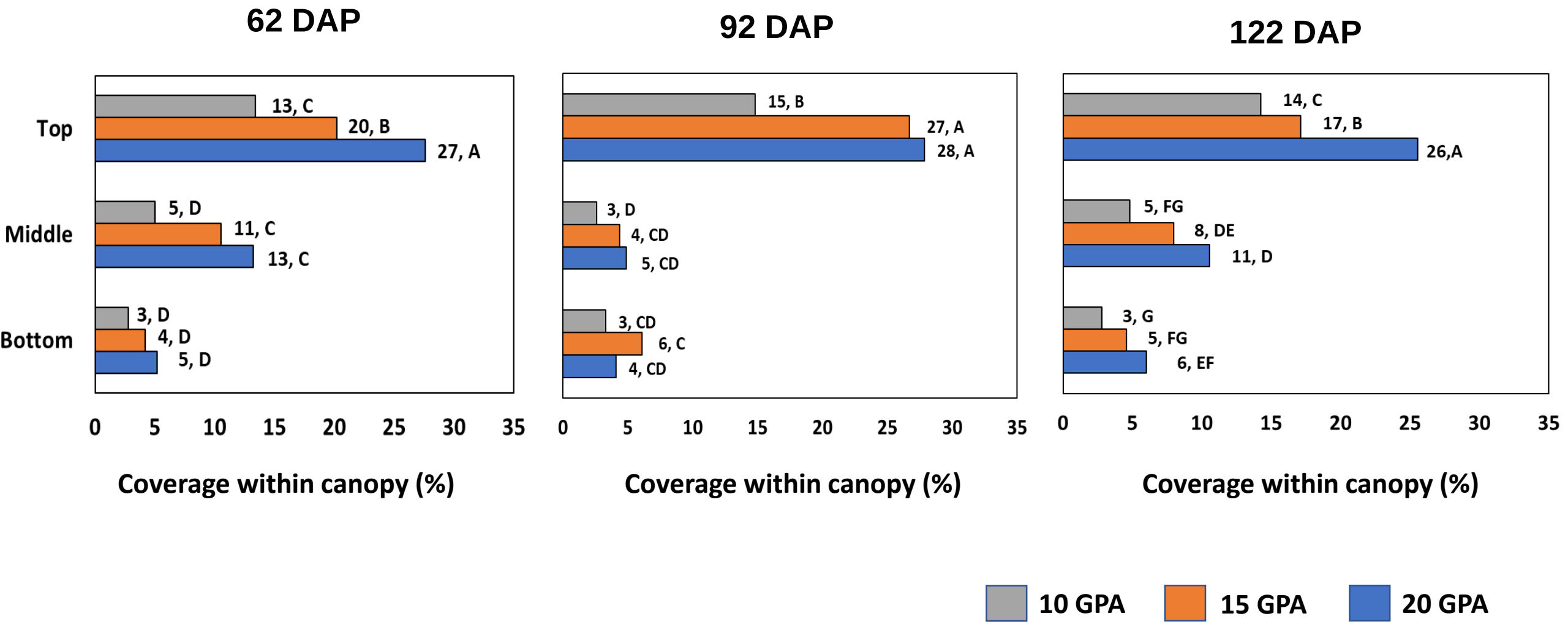
62 DAP

92 DAP

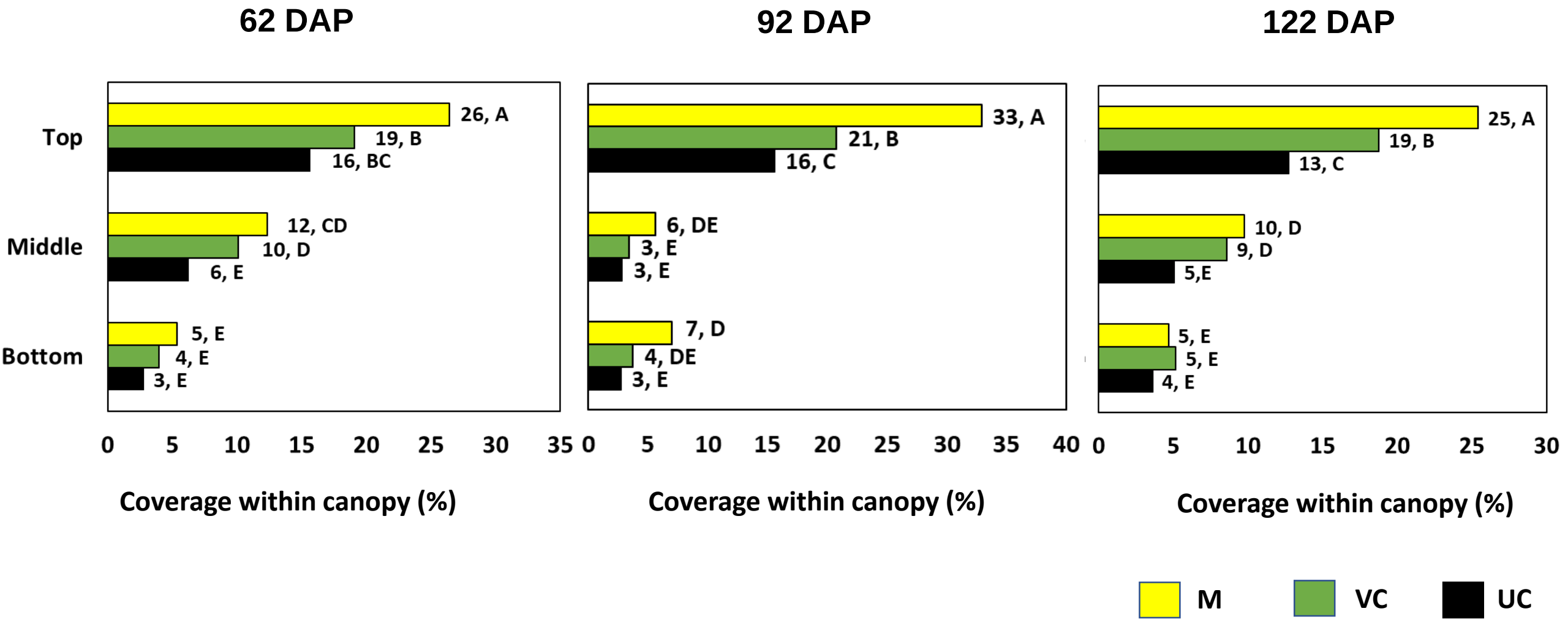
Spray Coverage (2021)

Main & Interaction Effects	47 DAP	62 DAP	92 DAP	122 DAP
Volume (GPA)	0.3887	<.0001*	<.0001*	<.0001*
Droplet size	0.5862	<.0001*	<.0001*	<.0001*
Position in canopy	<.0001*	<.0001*	<.0001*	<.0001*
Volume (GPA)*Droplet size	0.0117*	0.0435*	0.025*	0.001*
Volume (GPA)*Position in canopy	0.9896	0.0009*	<.0001*	0.0013*
Droplet size*Position in canopy	0.8683	0.0259*	<.0001*	<.0001*
Volume (GPA)*Droplet size*Position in canopy	0.6083	0.6791	0.7961	0.651

Application Volume x Position within Canopy



Droplet Size x Position within Canopy



Summary

- Both application volume and droplet size had a significant interaction with position within the canopy
  - **Spray Volume x Position:** Higher volume increased spray penetration up to middle of the canopy.
  - **Droplet Size x Position:** Both medium and very coarse droplet provided comparable coverage in the middle.

Future Research

Evaluating the influence of these applications parameters on spray coverage, penetration and efficacy in fields with high disease/pest pressure in the season.

Acknowledgments

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Georgia Peanut Commission

National Peanut Board