

OPTIMIZED TIMING OF CYCLONE APPLICATIONS FOR COTTON DESICCATION

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Abstract

Variations in the performance of paraquat have been observed when it has been applied at different times of the day. A study was conducted to determine the optimal time of day to apply Cyclone® for cotton desiccation and the best rate of Cyclone® to be applied at this time. Treatments included an untreated check and Cyclone® applications of 4, 8, and 16 oz/A, each applied at three times (8 A.M., 1 P.M., and 6 P.M.). The best rate was the 16oz/A rate. The best time of application was the 6 P.M. timing. The results obtained from this study indicate that for best results, Cyclone® applications should be made in the evening with a rate of 16 oz/A.

Introduction

The ban of arsenic acid has led to the use of paraquat as the primary cotton desiccant. Paraquat is a contact herbicide which rapidly deteriorates cell membranes, causing desiccation and death of those cells. This rapid death of cells eliminates translocation of the herbicide. However, if applied in the dark some phloem movement may occur (Devine, et al., 1993). Inconsistencies in desiccation have been observed by producers when using paraquat. Marked differences in performance have been observed when farmers have applied paraquat at different times of the day. Areas sprayed later in the day were better desiccated than areas sprayed earlier in the day. Detailed scientific research documenting this timing effect is lacking.

Objectives

- 1) Determine the optimal time of day to apply Cyclone® for cotton desiccation.
- 2) Determine the best rate of Cyclone® to be applied at this time.

Materials and Methods

This study was conducted on the Texas A&M University Research Farm near College Station, Texas. Treatments included an untreated check and Cyclone®, a 2 lb. formulation of paraquat, at 4, 8, and 16 oz/A applied at 8 A.M., 1 P.M. and 6 P.M. A non-ionic surfactant, Silwet L-77®, at 0.25% v/v was added to all treatments. Treatments were applied with a self-propelled sprayer calibrated at 10

GPA. Applications were made at 1:00 and 6:00 P.M. on 22 August and 8:00 A.M. on 23 August, 1995.

Weather Conditions:

	<u>1:00 P.M.</u>	<u>6:00 P.M.</u>	<u>8:00AM</u>
Air Temperature:	95° F	91° F	85° F
Relative Humidity:	70%	65%	90%
Cloud Cover:	85%	65%	50%
Wind Speed:	5-7 mph	8-9 mph	2-3 mph
Wind Direction:	NE	NE	N

Ratings:

<u>3 DAT</u>	<u>14 DAT</u>
Desiccation	Desiccation
	Defoliation
	% open bolls

% defoliation + % desiccation + % green leaves = 100%

Defoliation and desiccation for the rating taken on 14 DAT were added together and analyzed as total desiccation since defoliation was due to desiccation.

Results and Discussion

The treatment which gave the best result in this study at 14 DAT was the 16 oz/A rate of Cyclone® applied at 6 P.M. (Figure 1 and 2). Desiccation produced by 8 oz/A at 6 P.M. was not significantly different from the 16 oz/A rate applied at 1 P.M.

Rate of Application

When averaged across timings, desiccation for the 16 oz/A rate of Cyclone® was greater than both the 4 and 8 oz/A rates at 3 and 14 DAT (Figures 3 and 4). The 8 oz/A rate was also consistently more effective than the 4 oz/A rate at 3 and 14 DAT.

Time of Application

Averaged across rates, Cyclone® applied at 6 P.M., provided 21% and 7% more desiccation at 3 DAT and 14 DAT, respectively, than the 1 P.M. applications. Compared to the 8 A.M. applications, the 1 P.M. timing resulted in 17% and 8% greater desiccation at 3 DAT and 14 DAT, respectively (Figures 5 and 6).

Percent Open Bolls

Percent open bolls ranged from 95.5% to 99.4% at 14 DAT and were not different between treatments (Figure 7).

Conclusions

The results of this study suggest that maximum desiccation of cotton with Cyclone® was achieved when applications were made in the afternoon and evening, using 16 oz/A. If Cyclone® is applied in the morning, rates as high as 16 oz/A may not result in the desired effect. The results of this study agree with those of Bremer (1995), who found that by applying Cyclone® in the evening more defoliation and less regrowth of cotton occur. Further studies are needed to

determine the physiological differences of the plant that lead to the differences in desiccation of paraquat when applied at different times of the day.

Literature Cited

Bremer, J. E. 1995. Timing does influence harvest aids. Southwest Farm Press. 5 Oct 1995, p.15.

Devine, M. D., S. O. Duke, and C. Fedtke. 1993. Physiology of Herbicide Action. p. 85.

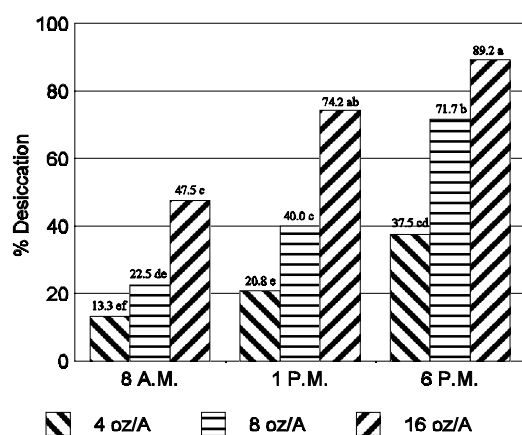


Figure 1: Percent desiccation of Cyclone®-treated cotton for three rates and three times of application at 3 DAT.

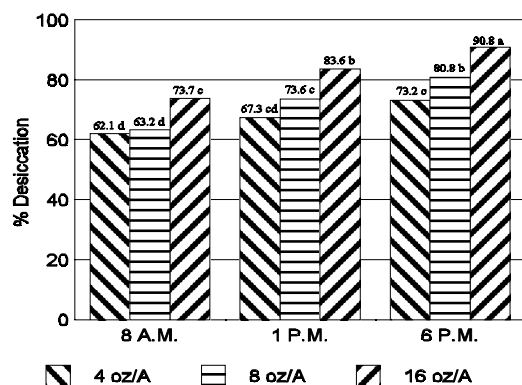


Figure 2: Percent desiccation of Cyclone®-treated cotton for three rates and three times of application at 14 DAT.

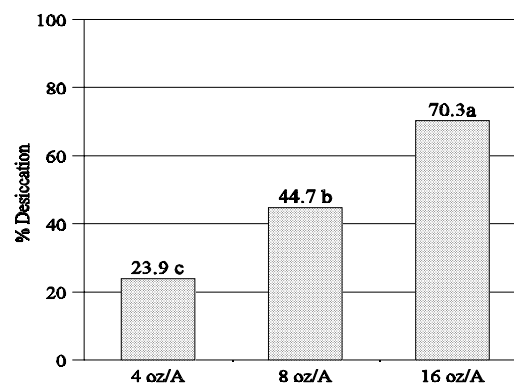


Figure 3: Percent desiccation of Cyclone®-treated cotton for three rates, averaged across timings at 3 DAT.

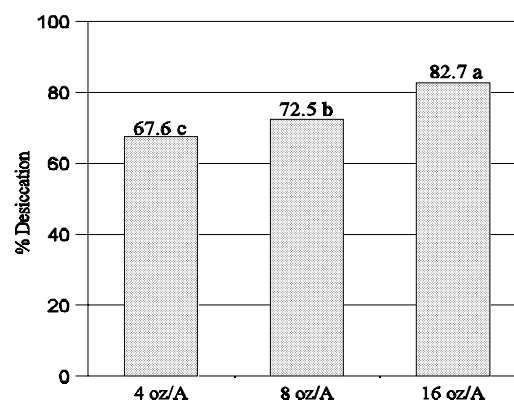


Figure 4: Percent desiccation of Cyclone®-treated cotton for three rates, averaged across timings at 14 DAT.

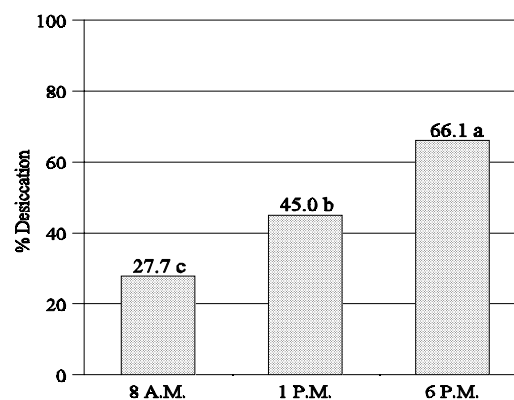


Figure 5: Percent desiccation of Cyclone®-treated cotton for three times of application, averaged across rates at 3 DAT.

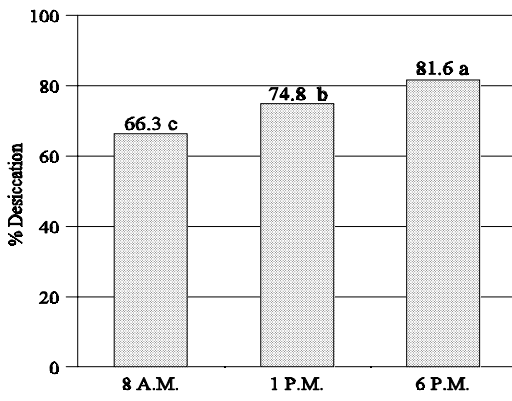


Figure 6: Percent desiccation of Cyclone®-treated cotton for three times of application, averaged across rates at 14 DAT.

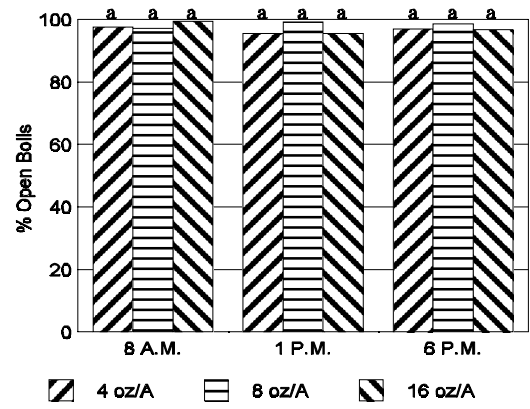


Figure 7: Percent open bolls of Cyclone®-treated cotton for three rates and three times of application at 14 DAT.