Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 12 *Keeping up with Research*

Article 33

1974

Effectiveness of Paraquat As Influenced by Carrier Volume and Climatic Conditions (1984)

Charles A. Norwood

Recommended Citation
Norwood, Charles A. (1974) "Effectiveness of Paraquat As Influenced by Carrier Volume and Climatic Conditions (1984)," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 12.
https://doi.org/10.4148/2378-5977.7270

AES Keeping Up With Research 79

June 1984

Effectiveness of Paraquat As Influenced by Carrier Volume and Climatic Conditions

Charles A. Norwood, Research Agronomist

Traditionally, herbicides applied with ground equipment have been combined with relatively large (20 gallons per acre or more) volumes of water. This has been particularly true with postemergence herbicides in order to obtain complete coverage of the foliage for good control. One notable exception to this is Roundup. Roundup is more effective in a low volume of water, because it can be deactivated by salts present in the water. Paraquat, on the other hand, has usually been applied in 20 to 40 gallons per acre of water. Recently, research at Garden City and other locations demonstrated that Paraquat is also effective in low carrier volumes. The results of that research and also some additional research with Roundup are the subject of this report.

Results

The results of one experiment with Roundup, designed to illustrate the effects of carrier volume, are presented in Table 1. Note that the control of volunteer wheat decreased as the volume of water increased. Similar results are well documented and are the reason that low water volumes are recommended for applications of Roundup.

Contribution 84-425-S, Garden City Branch Station

Agricultural Experiment Station, Manhattan 66506

KSU KANSAS STATE UNIVERSITY

Keeping Up with Research 79 June 1984

AGRICULTURAL EXPERIMENT STATION
Kansas State University, Manhattan
John O. Dunbar, Director

Less well known is the influence of carrier volume on the effectiveness of Paraquat. Table 2 shows the control of Russian thistle and kochia with 16 oz of Paraquat, as affected by water volume. Maximum control of both Russian thistle and kochia occurred with 12 GPA, although statistically there was no difference between the 6 and 12 GPA rates (or between 6 and 36 GPA in the case of Russian thistle). Control of Russian thistle was less with 36 GPA than with either 12 or 24 GPA. Control of kochia declined significantly at both 24 and 36 GPA.

Conditions at application also can have an important effect on weed control. The effects of both carrier volume and climatic conditions on the control of volunteer wheat with 16 oz of Paraquat are shown in Table 3. The first application was made at 3 PM when the air temperature was 97°F, relative humidity 37%, and wind speed 10 to 12 mph. The second application was made at 7 AM the next morning when the air temperature was 70°F, relative humidity 80%, and the wind less than 5 mph. Nearly 100% control was obtained with the 6 and 12 GPA water volume applied at 3 PM, while significantly less control was obtained with the 24 and 36 GPA volumes. Perfect control was obtained from all applications made at 7 AM.

Table 1. Percent control of volunteer wheat with Roundup, as affected by volume of water, 1982.

Volume of Water (GPA)	% Control		
	6 oz/a	8 oz/a	12 oz/a
3	98	100	100
6	97	97	100
12	86	75	99
24	68	73	96

Table 2. Influence of volume of water on the effectiveness of Paraquat, 1983.

Volume of Water (GPA)	% Control	
	Russian Thistle	Kochia
6	91	80
12	100	87
24	100	77
36	87	67
LSD (.05)	10	9

Table 3. Control of volunteer wheat with Paraquat as affected by volume of water and climatic conditions.

Volume of Water (GPA)	% Control	
	3 PM[a]	7 AM[b]
6	97	100
12	99	100
24	75	100
36	85	100
LSD (.05)	12	

[a]Temp. 97F, rel. hum. 37%, wind 10-12 mph.
[b]Temp. 70F, rel. hum. 80%, wind 5 mph.

Improved control with Roundup with lower volumes of water is due to less deactivation of the chemical by salts in the water. The reason for improved control with Paraquat in a low volume of water is less clear. It is unlikely that Paraquat is deactivated in the water. It is possible that better coverage is obtained with the finer droplets produced by the smaller spray tips used for low volumes of water. Finer spray droplets also can be obtained by increasing the pressure. However, if the pressure is increased above 35-40 psi with the preferred fan tips, excessive drift and loss of chemical will occur. A constant pressure of 30 psi was used in these experiments.

Conclusions

Improved weed control with Roundup due to low carrier volume is well known. Paraquat also can be used in low volumes of water. Under ideal conditions, the volume of water will have little, if any, effect on the performance of Paraquat. Under hot, relatively windy conditions, however, lower volumes of water may result in increased effectiveness. In any event, this research indicates that low volumes of water will not diminish the effectiveness of Paraquat. Lower volumes of water also will require less frequent filling of the spray tank, resulting in savings of time and money.

Trade names are used to identify products. No endorsement of these products or criticism of similar products not mentioned is implied.