

AVADEX<sup>®</sup> BW COATED UREA GRANULES

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The concept of combining two or more crop chemicals for reasons of economy, time savings, reduced equipment requirements and unnecessary additional working of the soil, is not new. Indeed tank mixes of liquid fertilizers and triallate was registered some two years ago.

The development of the granular form of urea with three major desirable characteristics makes it suitable as a carrier and dispersing medium for triallate. These characteristics include (a) the relatively free flow of the treated granules, (b) the retention of a stable, hard, granular property when treated and (c) the safety factor when combined with an organic solvent.

Although these characteristics have been the major contributors to this specific use, one in particular poses the greatest problem and that is the size of the urea granule.

Triallate 10G granules number roughly 4.5 million granules per pound of product, whereas, urea granules number roughly 34,000 per pound of product (Table I). At an application rate of 13.5 pounds per acre of the triallate 10G granules, an even distribution would average about 10 granules per square inch of soil surface, whereas, 130 pounds per acre of urea granules would roughly average .7 granules per square inch of soil surface. This particular attribute necessitates an effective incorporation procedure to obtain maximum herbicide efficacy.

TABLE I

Relative comparison of urea granules compared to triallate 10G granules.

	<u>No./lb</u>	<u>No./sq.in.</u>
Triallate 10G	4,500,000	10 (13.5 lb/a)
Urea	34,000	.7 (130 lb/a)

Incorporation of either the 4EC or 10G formulations of triallate play a very large part in the performance of the herbicide. Table II summarizes the findings of research performed by Dr. McBeath at the Lacombe Research Station and supported by Cominco Ltd., of Calgary. The work was performed over a period of three years and the commercial formulation of triallate 4EC at 1.4 kg/ha. was applied on 224 kg/ha. of granular

urea in each case. Five implements for incorporation were used in various combinations of operations. These were compared for wild oat control to the commercial triallate formulation applied at the same rate and incorporated once with a double disc and followed by two harrow operations. The percentage wild oat control appears in the columns for each combination of tillage operations. In the majority of cases the more tillage operations the better the wild oat control. The single disc and the rotovator incorporations did not provide acceptable results. The double disc provided good results but appears slightly inferior to the field cultivator followed by harrows. Two operations with the field cultivator followed by two harrow operations was equal to, or slightly superior to, the triallate incorporated once with the double disc followed by two harrow operations for wild oat control.

TABLE II

Effect of tillage incorporation of triallate-urea mixture on the control of wild oats.<sup>1</sup>

Treatment <sup>2</sup>	1976 (% control)	1977 (% control)	1978 (% control)
Triallate			
DD <sup>4</sup> + H(2) <sup>3</sup>	89	72	96
Triallate-urea mix			
C + H	83	-	-
C + H(2)	87	66	89
C(2) + H(2)	89	81	97
DD + H	62	-	-
DD + H(2)	79	61	93
DD(2) + H(2)	81	59	87
D + H	73	-	-
D + H(2)	87	40	-
D(2) + H(2)	85	41	-
R + H	63	-	-
R + H(2)	-	50	-
R(2) + H	75	-	-
R(2) + H(2)	-	64	-

1 McBeath, D.K. Agriculture Canada. Lacombe.

2 Triallate 4EC applied at 1.4 kg/ha. and urea applied at 224 kg/ha. in all cases.

3 (2) represents two operations, otherwise only one operation was performed.

4 Letters represent the following operations -

DD - double disc  
H - harrows  
C - cultivator  
D - single disc  
R - rotovator

TABLE III

Wild oat control with triallate-urea combinations.

N (kg/ha.)	Triallate (kg/ha.)	Form. (lb/gal.)	P.P.I.Barley <sup>1</sup> (% control)	P.P.I.Barley <sup>2</sup> (% control)	P.P.I.Wheat <sup>3</sup> (% control)	P.P.I.Wheat <sup>4</sup> (% control)
45	1.4	4 EC <sup>5</sup>	58	-	-	47
67	1.4	4 EC <sup>5</sup>	67	91	93	48
90	1.4	4 EC <sup>5</sup>	68	86	90	58
45	1.4	6 SN	67	-	85	48
67	1.4	6 SN	79	57	92	55
90	1.4	6 SN	53	86	82	63
45	1.4	8 SN	43	66	90	65
67	1.4	8 SN	82	93	98	67
90	1.4	8 SN	84	94	95	67
90	-	-	-8	-	-	-
90	1.4	4 EC	85	-	99	80

1 Gallagher, A. Monsanto Canada Ltd., 1977. Edmonton.

2 McBeath, D.K. Agric. Canada. 1977. Lacombe.

3 Forbes, B.C. Monsanto Canada Ltd. 1977. Winnipeg.

4 O'Sullivan, P. A. Monsanto Canada Ltd. 1977. Calgary.

5 Letters represent the following

EC - emulsifiable concentrate

SN - a solution with solvent only and no emulsifier

Investigations were carried out at several sites in Western Canada during 1977 with three formulations of triallate and three levels of urea granules. These trials were conducted to investigate the effect of the triallate formulations and rates of urea upon the efficacy of the various mixes of urea and triallate for wild oat control. The various mixes were applied preplant incorporated on barley and pre-emergence incorporated on wheat.

Results indicate a trend to better wild oat control with the eight pound per gallon solution formulation of triallate (Table III). The six pound per gallon solution formulation did not provide a consistent trend towards improved efficacy over the commercial formulation. Although the eight pound per gallon solution formulation does appear to provide for an increase in efficacy, the formulation is unstable and the triallate precipitates as crystals over a prolonged period of storage. This factor makes the formulation unsuitable for the market place. The six pound per gallon solution formulation has not precipitated under similar conditions.

Granular urea at the rate of 67 kg/ha. of nutrient N has provided acceptable levels of wild oat control when compared to the higher rate of 90 kg/ha. of N (Table III). The 45 kg/ha. rate of N generally provided less consistent and lower levels of wild oat control.

During 1977 twenty four field scale commercial type applications were estimated for wild oat control in Northern Alberta (Table IV). Visual estimates of wild oat control were accomplished by comparing treated areas to application misses which served as untreated checks. The majority of fields were seeded to barley (19) followed by rapeseed (3) and wheat (2). Very good wild oat control was provided with the mixture as in excess of eighty percent of the treated fields and acreage provided ninety percent or better wild oat control.

TABLE IV

Results of commercial type applications of triallate-urea mixtures in Northern Alberta on 24 fields.

	Ranges of % W.O. control <sup>1</sup>				
	<80	80+	90+	95+	99+
Percentage of acres	<u>6</u>	<u>94</u>	<u>84</u>	<u>72</u>	<u>37</u>
Percentage of fields	8	92	83	67	29

<sup>1</sup> Gallagher, A. Monsanto Canada Ltd. 1977. Edmonton

Table V presents the results of fourteen field scale commercial type applications of the mixture of triallate as a six pound per gallon solution formulation and granular urea on

barley or rapeseed in Northern Alberta. All mixtures were applied preplant incorporated with the indicated spreaders and incorporation equipment. Wild oat control was estimated by making four paired square meter counts in the check strip and the treated areas. The triallate formulation was mixed with 145 to 400 kg/ha. of granular urea at the rate of 1.4 to 1.7 kg/ha. The mixtures were applied with a Wilmar spin type or Barber screw metered type applicators.

TABLE V

Field scale applications of the triallate-urea mix in Northern Alberta.<sup>1</sup>

Crop	Spreader	Incorporation <sup>2</sup>	Triallate <sup>3</sup> (kg/ha.)	% Wild Oat Control
Barley	Barber	DD + H	1.4	68
Barley	Barber	DD + H(2)	1.4	70
Barley	Barber	C + H	1.4	92
Barley	Barber	C(2) + H(2)	1.4	91
Barley	Barber	VS(2) + H(2)	1.4	97
Barley	Barber	C(2)	1.4	89
Barley	Wilmar	C(2)	1.4	88
Barley	Wilmar	VS(2)	1.4	97
Barley	Wilmar	VS(2)	1.4	87
Rapeseed	Wilmar	VC(2)	1.7	76
Rapeseed	Wilmar	VS(2)	1.7	98
Rapeseed	Wilmar	VS(2)	1.7	95
Rapeseed	Wilmar	VS	1.4	98
Rapeseed	Wilmar	VS	1.4	90

1 Gallagher, A. Monsanto Canada Ltd. 1978. Edmonton

2 Letters represent the following operations -

DD - double disc

H - harrows

C - field cultivator

VS - vibrashank cultivator

VC - vibrachisel

(2)- represents two operations, otherwise only one operation was performed.

3 A triallate 6 SN formulation was used in all applications.

The factor which most obviously affected the performance of the mixture appeared to be the type of implement used to incorporate the mixture. Averaging the level of wild oat control for each incorporation implement, regardless of the number of operations performed with it or the number of harrow operations which followed, showed that the vibrashank cultivator provided an average of 94 percent control of wild oats on 3 barley fields and 95 percent wild oat control on 4 rapeseed fields. The field cultivator follows with an average of 90 percent wild oat control on 4 barley fields. The double disc and vibrachisel were

substantially less effective. These results support the results obtained by McBeath at the Lacombe Research Station where the cultivator was the best implement for obtaining maximum efficacy from the mixture.

The Wilmar and Barber spreaders performed in a very acceptable manner. The Wilmar requires a 50 percent overlap on each pass for even distribution, whereas, the Barber requires only one pass over each treatment area. The Wilmar is prone to missing a strip of the outside round which cannot be effectively overlapped.

Recommendations for the use of the mixture according to the registration are as follows:-

- Use the recommended rates of the commercial formulation for each crop treated to a maximum of 1.5 lb./a.
- The product must be applied on a minimum of 130 lb/a of granular urea.
- Follow labelled incorporation guidelines but delay the second incorporation for 24 hours.
- Application equipment must be calibrated for each mixture and must provide an even distribution of the treated granules.
- The incline access blender and the paddle type blender provide adequate mixing.
- Applications and crops covered by the registration are -

Fall applications (after October 1) on barley, wheat, rapeseed and flax.

Spring pre-plant incorporated applications on barley, rapeseed and flax.

The vibrashank and field cultivators are highly recommended and pre-emergent incorporation with harrows is not advised in order to obtain maximum wild oat control with the triallate-urea mixture.