EXPERIMENTAL RESULTS WITH EPTAM AND TILLAM
OREGON AGRICULTURAL EXPERIMENT STATION--1962

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Methods of Application - Field Test

Eptam and Tillam were applied by three different methods to plots prior to planting red beets and sweet corn. Discing was accomplished by covering the area two times, traveling in the same direction. Both the disc and the rotary tiller were set to a depth of approximately three inches. The subsurface blade applicator sprayed a 12 inch wide band at a depth of approximately two inches. This would be below the level of seeding the crops. The herbicides were applied June 22 and the crops planted June 23. The first irrigation was June 26. Weed control ratings (0 = no effect, 10 = complete kill) were made July 20. Principal weed species present were lambsquarters (Chenopodium album) and redroot pigweed (Amaranthus retroflexus). Weed control ratings are summarized in the following table:

Chemical	Rate/acre (lbs. active)	Soil Incorporation Method	Ave. Weed Control Rating
Eptam	2	disc	6
"	4	"	7
"	2	rotary tiller	7
"	4	"	8
"	2	subsurface blade	6
"	4	"	6
Tillam	2	disc	5
"	4	"	5
"	2	rotary tiller	5
"	4	"	5
"	2	subsurface blade	4
"	4	"	5
Untreated Check	-	----	3

Summary of analysis

	df	mean squares	F
Treatments	12	17.63	11.17**
Eptam vs. Tillam	1	310.08	196.50**
Disc vs. rotary tiller	1	0.83	
Disc vs. subsurface blade	1	30.08	19.64**
Rotary tiller vs. subsurface blade	1	33.33	21.12**
Residual	60	1.578	

** Significant F test at 1% probability level

As would be expected, the weed control obtained with Eptam was superior to that for Tillam when the two materials were compared at the same application rates. There was no difference in weed control if the herbicides were incorporated into the soil with a disc or rotary tiller, but application with a subsurface blade resulted in less weed control than the

other methods used in this test. This is not consistent with results from other tests and the reason for this inconsistency is not known.

Observation of the two crop species showed some response to treatments; and although no measure of crop yields was made, it is questionable that yield reductions would result from the slight injury noted in these plots.

Interaction of Eptam and Inorganic Compounds

Some bean fields were observed in the Willamette Valley in 1961 in which there was some apparent damage due to Eptam applications. These fields had heavy fertilizer and lime applications and it appeared that the damage could have been due to a high soluble salts concentration in the soil, and perhaps aggrevated by the presence of Eptam.

To obtain information on this possible effect of the combination of high salts and Eptam in the soil, a greenhouse test was set up on August 25, 1961. The treatments were selected for a complete factorial with Eptam at rates of 0, 3, 6, and 12 pounds actual per acre; and $CaCl_2$ and $Ca(OH)_2$ at 0, 1000, 2000, and 4000 pounds per acre. In each container bean and corn seeds were placed on top of untreated soil. These were covered with approximately one inch of soil in which the calcium salts had been mixed and the Eptam applied to this surface. About an inch of soil containing the calcium salts then covered the Eptam application.

Observations of plant response, with particular note of injury symptoms, were made. The most prevalent effect of Eptam on beans when used without $CaCl_2$ was a marginal necrosis of the very small leaves. As these expanded, the leaves tended to cup since the marginal areas did not grow. This is the same effect noted in the field during the summer and very closely resembles injury from high soluble salts in the soil. Responses with $CaCl_2$ were more severe with extreme stunting, complete plant necrosis or failure to emerge, regardless of Eptam concentration. Responses of corn to Eptam were typical, with some stunting and failure of the leaves to unfold properly. At the 12 pound rate many of the corn plants were killed. There was a good correlation of injury ratings and the harvested plant weights. Only the plant weights are presented here in the following table with a summary of the analyses.

AVERAGE PLANT DRY WEIGHT PER PLOT (GRAMS)

	Beans				Corn			
Eptam	0	3	6	12	0	3	6	12
$CaCl_2$								
0	7.8	6.5	5.1	4.3	7.2	1.6	1.0	0.2
1000	2.2	1.4	2.0	0.0	6.0	0.6	1.6	0.2
2000	1.5	0.0	0.0	0.2	3.4	0.6	0.2	0.2
4000	0.5	0.0	0.0	0.0	0.8	0.1	0.0	0.0
$Ca(OH)_2$								
0	8.4	5.6	6.2	3.8	6.5	1.4	1.0	0.4
1000	8.7	8.6	4.7	1.1	8.3	2.8	1.2	0.8
2000	7.6	7.5	4.4	1.1	5.7	1.7	1.9	0.4
4000	5.6	8.8	3.6	1.4	9.5	3.0	0.8	0.1

Summary of analyses on beans

	df	mean squares	F
Eptam	3	69.13	96.01**
$CaCl_2$	3	154.62	214.75**
Eptam X $CaCl_2$	9	3.17	4.40**
Residual	32	0.72	
Eptam	3	96.00	18.36**
$Ca(OH)_2$	3	2.45	
Eptam x $Ca(OH)_2$	9	5.06	
Residual	32	5.23	

Summary of analyses on corn

Eptam	3	45.34	83.19**
$CaCl_2$	3	6.86	12.59**
Eptam X $CaCl_2$	9	4.72	8.66**
Residual	32	0.55	
Eptam	3	121.41	87.98**
$Ca(OH)_2$	3	3.60	2.61
Eptam X $Ca(OH)_2$	9	2.71	1.96
Residual	32	1.38	

** Significant F test at 1% probability level

These analyses were made separately, although the experiment was run as a complete unit, because there was no particular interest in a comparison of the components other than those tested. The most obvious effects are the reductions of plant growth with increasing rates of Eptam or increasing concentrations of $CaCl_2$. The interaction occurred only with the $CaCl_2$ combination and the effect was relatively small. The significant interactions with both beans and corn were due the extreme toxicity of higher $CaCl_2$ levels so that the plants were not responsive to Eptam levels as they were in the case of no $CaCl_2$ or in the $Ca(OH)_2$ treatments. In any event, the effect was not synergistic and there is apparently no reason for concern in the use of Eptam under high salt conditions other than possible additive injury effects.

Eptam on Strawberries - Greenhouse Test

An experiment was set up to study the effects of degree of establishment of strawberry plants on their response to Eptam. Strawberry plants of the Marshall variety that had been established as runner plants in the fall were moved into the greenhouse in January, February, or March 1961 and set into number ten cans. Eptam application rates were calculated on the basis of soil surface per container and were equal to 5 and 15 pounds actual per acre. These were applied as the granular formulation. The various herbicide treatments and the average strawberry plant response ratings are listed in the table.

The injury symptoms varied from a darkening of the foliage with some stunting and crumbling of the leaves to killing the plants in the most severe treatments. Plants that were established for two months before application showed no appreciable response to surface applications of either rate of Eptam. Plants established for one month or two weeks before application showed slight effect with the lower application rate but moderate to considerable injury at the higher rate. Surface applications immediately after planting also showed only moderate plant injury. Of those applications incorporated into the soil immidiately before planting, that placed in a layer 1 1/2 inches below the surface resulted in the most severe strawberry plant injury, that mixed with the surface four inches of soil resulted in severe injury, particularly at the higher application rate, and the Eptam layered at the four inch level resulted in only moderate injury for the duration of the observation period of this test.

From these results it appears that Eptam can be used on established strawberry plants providing the root system is deep enough to escape any herbicide concentrations of Eptam applied on or near the surface; but the strawberry plants probably do not possess a great amount of biological resistance and the effect on plant growth would be related to the portion of the plant roots affected and the concentration of the herbicide in the root zone.

STRAWBERRY PLANT RESPONSE TO EPTAM

Planting Date	Application Rate	Type of Application	Ave. Plant Response-April	Rating May
Jan. 13	5	surface	3	3
"	10	"	4	3
"	untreated check		2	2
Feb. 10	5	surface	4	4
"	10	"	5	8
"	untreated check		3	5
Feb. 24	5	surface	3	3
"	10	"	4	3
March 10	5	"	4	5
"	10	"	5	4
"	5	mixed with	4	5
"	10	top 4 inches	7	9
"	5	layered at	3	2
"	10	4 inch level	5	3
"	5	layered at	6	9
"	10	1½ inch level	9	10
"	untreated check		0	0