

Assessment of Value of Aqueous Nitrogen  
Fertilizer Solutions as Fertilizer and Herbicide  
Supplement in Broccoli

Garvin Crabtree  
N.S. Mansour  
Department of Horticulture  
Oregon State University

**STATUS:** The research conducted in 1989 was for the second year of this two-year project.

**FUNDING:** The Oregon Processed Vegetable Commission provided \$2680 to assist in paying for costs for the 1989 study. Approximately three-fourths of this funding has been used for personnel costs, the remainder for services and supplies.

**OBJECTIVES** of this project, remain as stated in the proposal, and are as follows:

- 1) Determine the potential selective herbicidal activity of three nitrogen-containing fertilizer solutions.
- 2) Compare broccoli response to nitrogen applied in these foliar sprays to equal amounts of nitrogen applied in the usual form of side-dressed fertilizer.

**PROGRESS:** Two plantings of broccoli 'Gem', seeded on April 12 and 28, 1989 were established on Chehalis sandy loam soil at the Horticulture Research Farm, Corvallis, OR. Fertilizer (18N, 44P, 15K and 10S - lbs. per acre) was broadcast and soil incorporated prior to planting. The early and late plantings of broccoli were thinned on May 5 and 24, 1989, respectively, to leave plants spaced at 9 inches in the rows (rows spaced 18 inches apart). On May 16, 1989 when the first planting was in the 5-leaf stage and the second planting had 1 to 3 leaves (designated as 2-leaf stage), liquid fertilizer sprays were applied. Treatments used are shown in the table. Sprays were either broadcast (BRO) to give complete, uniform coverage over appropriate test plots or applied as a directed (DIR) spray so that the fertilizer sprays covered the area between rows and the crop plant row was avoided. Plots were evaluated on May 19, 1989 (early rating) for weed control and crop response. Subsequently, all plots were uniformly cultivated and weeded check plots were hand weeded. Evaluations of general weed control (ALL WEEDS) and crop response were made on June 21 and June 28, 1989, prior to harvest, for the April 12 and April 28, 1989 plantings, respectively.

On June 26, 1989, various amounts of ammonium nitrate was applied as a side dressing fertilizer to result in a total N application of 208 lbs per acre. Cultivation following on the same day served to incorporate the fertilizer, as well as to control weeds between

the broccoli rows. Plots were harvested (primarily center heads) on three separate dates for each planting. Harvest numbers and weights of each planting were combined for the total yield for each plot. Somewhat lower yields for the second planting reflect a slightly advanced harvest schedule as compared to the first planting.

Results, as shown in the table, confirm findings of the 1988 field study. Weed control is variable between species and incomplete, so that additional control measures are needed to supplement the effect of nitrogen fertilizer sprays. Application method (broadcast or directed) of the fertilizer sprays generally had little influence on their weed control effectiveness. Although this study was not designed for a precise comparison of timing of the sprays, this factor was important, with the earlier application (broccoli 2-leaf stage) often giving higher weed control ratings. With the considerable variability present in these data there is no clear preference among treatment materials or combinations. As was found in 1988, AN-20 appeared to have the most effect on weeds and crop when compared to equal gallonage applications of other materials. The combination of AN-20 and ammonium thiosulfate was essentially as effective in controlling weeds as AN-20 alone.

Broccoli injury ratings (leaf necrosis and growth reduction) were usually consistent between the early (soon after application of the fertilizer sprays) and late (just before first harvest) evaluation dates and even though crop injury was not readily apparent from a casual inspection at harvest, closer study showed evidence of leaf necrosis and reduced growth. There was also a strong inverse relationship between injury ratings and yield with the highest injury ratings and lowest yields resulting from the broadcast applications over the second planting.

In this study, there was no significant difference in broccoli production when part of the nitrogen fertilizer was applied as a directed spray as compared to an equal amount of N applied as a side dressing of ammonium nitrate.

**SUMMARY:**

In a comparison of nitrogen fertilizer spray treatments, the best control of weed species was obtained when applications were made to small weeds (broccoli 2-leaf stage). Using a directed spray to minimize contact with the crop plants resulted in the least crop injury and the best broccoli yields. There was not much difference between the various materials used as fertilizer spray treatments but slightly more herbicidal activity was observed in the AN-20 plots. Crop response to this material was satisfactory if the applications were made as directed spray; in the broadcast spray treatments, more crop safety was exhibited if combinations of AN-20 and ammonium thiosulfate or AN-20 and Solution-32 were used.

Oregon broccoli growers should be able to incorporate information obtained from this project into their production practices. Use of fertilizer sprays as a supplementary weed control measure should result in lower production costs/greater broccoli yields/improved product quality.

Redacted for Privacy

PROJECT LEADER:

\_\_\_\_\_

Redacted for Privacy

PROJECT LEADER:

\_\_\_\_\_

Redacted for Privacy

DEPARTMENT HEAD:

\_\_\_\_\_

WEED CONTROL IN BROCCOLI - 1989

No.	Fertilizer	Appln Rate (Gal/Acre)	Type <sup>1</sup> of Appln	Brocc Stage	Weed Control (%) <sup>2</sup>						Broccoli Injury Rating (%)			Yield	
					BRSRA/ RAPRA	SOLSA	SPRAR	MATMT/ ANTCO	CAPBP	ALL WEEDS	early	late	No. of Heads	Tons/Acre	
1	AN-20	60	BRO	5-LF	38	50	7	24	45	55	6	20	37	2.0	
				2-LF		93	31			66	24	11	24	1.9	
2	AN-20	90	BRO	5-LF	56	73	39	45	83	76	13	15	37	2.7	
				2-LF		93	23			54	39	15	20	1.3	
3	AN-20	60	DIR	5-LF	46	60	24	28	56	75	10	8	37	2.3	
				2-LF		63	10			100	3	10	29	3.1	
4	AN-20	90	DIR	5-LF	31	33	15	19	39	68	5	20	39	2.7	
				2-LF		93	31			66	24	11	35	3.3	
5	Ammonium thiosulfate	60	BRO	5-LF	43	49	15	18	65	60	6	11	36	2.4	
				2-LF		70	8			63	16	8	19	1.3	
6	Ammonium thiosulfate	90	BRO	5-LF	34	50	5	34	50	65	8	14	34	2.3	
				2-LF		91	30			74	20	18	22	1.5	
7	Ammonium thiosulfate	60	DIR	5-LF	36	45	9	18	55	45	8	13	34	2.4	
				2-LF		58	5			100	1	16	30	2.7	
8	Ammonium thiosulfate	90	DIR	5-LF	56	73	31	34	74	74	11	13	34	2.3	
				2-LF		80	28			100	8	18	30	2.6	
9	Solution-32	60	BRO	5-LF	29	50	20	26	58	60	9	8	38	2.5	
				2-LF		71	8			51	11	18	22	1.7	
10	Solution-32	90	BRO	5-LF	31	49	18	18	55	54	3	20	38	2.2	
				2-LF		75	8			50	16	14	19	1.3	
11	Solution-32	60	DIR	5-LF	35	60	17	35	64	73	6	11	37	2.5	
				2-LF		39	1			96	6	14	27	2.4	
12	Solution-32	90	DIR	5-LF	24	43	20	31	55	70	1	9	37	2.5	
				2-LF		40	3			98	3	10	34	3.0	
13	AN-20 Amm-thio	30) 30)	BRO	5-LF	35	63	19	30	50	64	4	19	31	1.9	
				2-LF		83	6			71	18	10	27	2.2	

14	AN-20	45)	BRO	5-LF	30	40	13	28	50	74	5	5	38	2.6					
	Amm-thio	45)		2-LF		84				30					78	20	13	17	
15	AN-20	30)	DIR	5-LF	35	63	19	30	50	64	4	5	39	2.7					
	Amm-thio	30)		2-LF		63				3					79	5	9	25	
16	AN-20	45)	DIR	5-LF	25	35	6	15	33	63	3	15	34	1.7					
	Amm-thio	45)		2-LF		66				5					100	1	10	31	
17	Soultion-32	30)	BRO	5-LF	28	40	18	23	47	74	4	8	35	2.7					
	Amm-thio	30)		2-LF		76				5					76	14	5	24	
18	Solution-32	45)	BRO	5-LF	38	53	27	28	55	64	6	13	38	2.5					
	Amm-thio	45)		2-LF		48				1					58	6	13	23	
19	Solution-32	30)	DIR	5-LF	48	64	12	30	69	66	1	14	33	2.3					
	Amm-thio	30)		2-LF		55				0					98	4	6	30	
20	Solution-32	45)	DIR	5-LF	30	50	11	20	45	44	3	16	37	2.1					
	Amm-thio	45)		2-LF		61				1					95	6	11	29	
21	Weeded Check	---	---	5-LF	8	13	4	9	20	53	0	6	32	2.1					
				2-LF		3				0					81	1	13	28	
22	Unweeded Check	---	---	5-LF	14	15	5	10	11	61	1	9	34	2.5					
				2-LF		0				0					93	0	1	34	3.9
		LSD (0.05)				5-LF				27					35	22	25	34	26
				2-LF		25	29			23	14	14	7	1.2					

1 Type of Application: BRO = broadcast, uniform application over plot  
DIR = directed, application between crop rows

2 Weed Control Rating: Visual evaluation of % control (stand and growth), individual species - early, ALL WEEDS - late  
Weed species abbreviations - BRSRA = birdsrape mustard  
RAPRA = wild radish  
SOLSA = nightshade  
SPRAR = corn spurry  
NATMT = pineapple weed  
ANTCO = mayweed chamomile  
CAPBP = shepherdspurse