A MULTIPURPOSE WETTING AGENT, WEX, AND A CULTURED BIOLOGICAL PRODUCT, AGRISPON, LEAVE POTATO YIELDS UNCHANGED[1]

Winston M. Laughlin[2], Glenn R. Smith[3] and Mary Ann Peters[2]

Abstract

Neither WEX, a multipurpose wetting agent, nor Agrispon, a cultured biological product, influenced potato foliage or tuber yields or tuber specific gravity. The beneficial effects of N application to potatoes grown on Knik silt loam were also demonstrated.

Resumen

Ni WEX, un agente humectante de propósito multiple, ni AGRISPON, un producto de cultivo biológico, afectaron al follaje de la papa o al rendimiento de tubérculos tampoco fue afectado el peso específico del tubérculo. Los efectos benéficos de la aplicación de N al cultivo de papas en suelos franco limosos del tipo "Knik" quedó simultáneamente demostrada.

Introduction

Nonfoaming wetting agents, marketed for use with herbicide and insecticide sprays, are also credited with increasing crop yields when applied to the soil. These increases have been attributed to increased solubilization of nutrients in the soil, providing the basis for more uniform nutrient distribution throughout the root zone and enhanced uptake of these nutrients by plants (1). We evaluated one of these wetting agents, WEX[4]—a chemical formulation the active ingredients of which are alcohol ethoxylates, propylene glycol, and dimethylpolysiloxane.

Agrispon[4], described as a cultured biological product, is credited with improving the soil and supplying N to crops biologically. Promotional pamphlets infer that when the product is used, the crops will require no added N. The name Agrispon is a trademark of Sn Corp., Inc. of Dallas, Texas; Agrispon was developed in Texas, and is promoted in western United States by Kountry Marketing International of Big Sandy, Texas. A Washington

---

[1]Cooperative investigation of Agricultural Research Service, USDA, and the University of Alaska Agricultural Experiment Station. Published with approval of director. Journal paper J-142 Journal Series Alaska Agric. Exp. Stn.

[2]Research Soil Scientist and Biological Technician, ARS, USDA, Agricultural Experiment Station, Palmer, Alaska 99645.

[3]Laboratory Technician, Alaska Agricultural Experiment Station, Palmer, Alaska 99645.

[4]To simplify terminology the trade names of the products (Agrispon and WEX) are used in this report. The use of these names is intended for the reader's benefit and implies neither endorsement nor criticism of these or of other products not mentioned.

Received for publication April 24, 1981.

KEY WORDS: WEX, Agrispon, yields.

distributor, Rare Soil Care of Colfax, Washington, advertises it as a "revolutionary new process to obtain nitrogen for all crops."

Following application techniques recommended by those reporting crops response, we evaluated WEX with Bake-King potatoes in 1977 and Agrispon with the numbered potato clone AK 10-1 in 1980 and AK 87-8 in 1981.

Materials and Methods

Bake-King and WEX

On May 17, 1977, a uniform area of Bodenburg silt loam (Typic Cryorthent) near Palmer was rototilled for a simple block experiment of 8 replications with Bake-King potatoes in plots 6 by 1 meters in size. Furrows were opened and 8-32-16 at 900 kilograms per hectare was applied uniformly in the bottom of the furrows and covered with 5 centimeters of soil. Then WEX treatments (0, 1.2, and 2.4 liters per hectare) were applied by adding the appropriate amount of WEX to water, mixing thoroughly, and applying the entire solution uniformly at the rate of 4500 liters per hectare to each appropriate plot. Plots not receiving WEX received the same amount of water. Forty uniform seed pieces were planted in each row; these were covered with soil and the entire area cultipacked. On May 31, dinitro-o-sec-butylphenol was applied uniformly over the experimental area for weed control. On August 30, the vines were removed from the plants, tubers were dug, and yields of both vines and tubers (U.S. No. 1 and small) were determined. The specific gravity of the tubers from each plot was determined on August 31 and dry-matter percentages calculated.

AK 10-1 Potato and Agrispon

On March 28, 1980, a uniform area of Knik silt loam (Typic Cryorthent) on the Matanuska Research Farm was selected, the experimental area marked in the grain stubble, and the row locations exactly located. One ml of Agrispon from the freshly shaken bottle was added to 3.8 liters of water in a sprinkling can. The solution was stirred vigorously, then applied uniformly to the appropriate 6-meter rows. At the time of Agrispon application, all other rows received the same quantity of water. On May 5 the entire area was rototilled to a 15-cm depth parallel to the rows to minimize dispersal of the Agrispon treatments. The previously located rows were marked and furrows opened. The appropriate fertilizer was distributed evenly in the bottom of the furrows and covered with two centimeters of soil. Forty seed pieces of potato selection AK 10-1, supplied by Dr. Curtis Dearborn, were planted in each row; these were covered with soil and the entire area cultipacked. After packing, the water and Agrispon treatments as described above were repeated. The three treatments replicated 8 times were as follows: no N, 60 lb N as ammonium nitrate, and Agrispon (2 ml per plot or 7.5 liters per 4 hectares). All plots uniformly received 48 kg P/ha

as treblesuperphosphate and 57 kg K/ha as sulfate of potash. Weeds were controlled by hand pulling and by frequent cultivation. On July 21 the average height and width of the potato foliage in each plot was recorded. On August 26 vines were removed from plants, tubers dug, and yields of both vines and tubers (U.S. No. 1 and small) determined. Specific gravity of the tubers from each plot was determined September 15 after storage under dark canvas at about 16°C in wooden crates.

AK 87-8 Potato and Agrispon

In 1981 the experiment with Agrispon was repeated on a different uniform area of Knik silt loam on the Matanuska Research Farm. The area was prepared for planting by plowing the grain stubble and then discing May 18. The same day furrows were opened and the appropriate fertilizer applied as in 1980. The Agrispon treatments as described previously were made after covering the fertilizer May 18. Forty seed pieces of potato selection AK 87-8, supplied by Dr. Curtis Dearborn, were planted in each row, covered with soil and the entire area cultipacked. After packing, the water and Agrispon treatments as described above were repeated. The three treatments and fertilization were identical to those in 1980. Again weeds were controlled by hand pulling and frequent cultivation. June 30 and July 24 each plot was evaluated and placed into one of four classes visually. On August 28 vines were removed from plants, tubers dug, and yields of both vines and tubers (U.S. No. 1 and small) determined. Specific gravity of the tubers from each plot was determined October 2 after storage under dark canvas at about 16°C in wooden crates.

Results and Discussion

Bake-King and WEX

Yield, specific gravity, and dry-matter percentages were not influenced significantly by WEX (Table 1). This lack of crop response to WEX application is consistent with the results of Fornstrom (2) with sugarbeets in Wyoming.

AK 10-1 Potato and Agrispon

Plots that received Agrispon or no N had essentially the same foliage height and width July 21 and foliage and tuber yields at harvest (Table 2). Nitrogen application increased the foliage height and width, and foliage and tuber yields. Tuber specific gravity was not influenced significantly by any treatment.

AK 87-8 Potato and Agrispon

Plots that received Agrispon or no N had essentially the same visual rating in June and July and foliage and tuber yields at harvest (Table 3). Nitrogen application increased the visual ratings, and foliage and tuber yields. Tuber specific gravity was not influenced significantly by any treatment.

TABLE 1. — *Effect of WEX on Bake-King aerial growth and tuber yields, tuber specific gravity, and dry matter grown in 1977 on Bodenburg silt loam (means of 8 measurements).*

WEX oz/A	Fresh weight yields: Vines + foliage (Metric tons per hectare)	Fresh weight yields: Tubers U.S. No. 1 (Metric tons per hectare)	Fresh weight yields: Tubers Small (Metric tons per hectare)	Tubers: Specific gravity	Tubers: % dry matter	Tubers: Dry matter Metric tons/ha
0	35.8a[1]	48.4a	3.4a	1.085a	22.0a	11.4a
16	36.3a	49.8a	3.8a	1.084a	21.8a	11.6a
32	37.2a	49.8a	4.0a	1.082a	21.6a	11.6a
C.V.[2](%)	18.7	11.8	23.9	0.5	4.2	9.9

[1]According to Duncan's multiple range test, column means followed by the same letter are not significantly different at the 5% level.
[2]Coefficient of variation (C.V.) indicates the dispersion of individual values around the mean. The larger the value the greater the variation within the experiment.

TABLE 2. — *Effect of Agrispon and N on AK 10-1 potato aerial growth and tuber yields and tuber specific gravity grown in 1980 on Knik silt loam (means of 8 measurements).*

	Foliage: Height (Centimeters)	Foliage: Width (Centimeters)	Fresh-weight yields: Vines + foliage (Metric tons per hectare)	Fresh-weight yields: Tubers U.S. No. 1 (Metric tons per hectare)	Fresh-weight yields: Tubers Small (Metric tons per hectare)	Tuber specific gravity
No N	46 b[1]	55 b	15.0 b	19.3 b	3.8 b	1.080a
N	58a	76a	23.1a	28.4a	5.8a	1.081a
Agrispon	47 b	53 b	15.7 b	19.3 b	3.8 b	1.079a
C.V. (%)[2]	11.3	10.6	7.3	9.9	14.6	0.2

[1]According to Duncan's multiple range test, column means followed by the same letter are not significantly different at the 5% level.
[2]Coefficient of variation (C.V.) indicates the dispersion of individual values around the mean. The larger the value the greater the variation within the experiment.

Agrispon is a living culture of microorganisms that includes fungi, algae, and associated bacteria. Vance (3) has identified and listed more than two dozen microorganisms in the product. His greenhouse study with green bean, radish, black-eye pea, and tomato plants showed that soil treated with Agrispon produced plants which grew as well as those receiving 10-20-10 fertilizer at 48 kg per hectare; a combination of N fertilizer plus Agrispon produced results no better than either Agrispon or fertilizer alone. We feel Vance's lack of response to fertilizer compared to Agrispon may result from the very low fertilization rate.

TABLE 3. — *Effect of Agrispon and N on AK 87-8 potato aerial growth and tuber yields and specific gravity grown in 1981 on Knik silt loam. (means of 8 measurement).*

	Visual rating[1]		Fresh-weight yields			Tuber specific gravity
			Vines + foliage	Tubers		
	June 30	July 24	Metric tons per hectare	U.S. No. 1	Small	
No N	1.0 b[2]	0.5 b	14.2 b	16.1 b	1.9a	1.088a
N	3.0a	3.0a	30.0a	32.8a	1.9a	1.091a
Agrispon	1.1 b	0.5 b	15.5 b	16.9 b	2.0a	1.088a
C.V. (%)[3]	25.2	23.2	8.2	10.5	8.9	0.4

[1]0 Very poor; 1 Poor; 2 Good; 3 Very good.

[2]According to Duncan's multiple range test, column means followed by the same letter are not significantly different at the 5% level.

[3]Coefficient of variation (C.V.) indicates the dispersion of individual values around the mean. The larger the value the greater the variation within the experiment.

Bezdicek[5] says "We have a bacterial count on the product you mentioned (Agrispon) and found less than 10^4 organisms per ml of undiluted product. At the recommended rate of application, the number of organisms added to the soil would be minimal." By contrast, agricultural soils contain in excess of 10^4 algae, 10^8 bacteria, and 10^4 fungi per gram of soil without microbial inoculation (1).

Our results with both WEX and Agrispon cause us to categorize them with several other soil additives and foliar sprays that have appeared on the market in recent years. Since most of these do not contain enough N, P, or K to be sold as fertilizer, they are sold as "nutrient-release agents", "soil conditioners", and "soil amendments". Most of these products are recommended for application either directly to the soil or as a foliar spray, and require low application rates as compared to fertilizer. The reasons for the claimed results are either unknown or a "trade secret" and accompanying testimonials are frequently based on one year's use in non-replicated trials or in greenhouse studies. Such products will not harm a crop, but replicated field experiments have not shown any beneficial results in Southcentral Alaska.

[5]Personal letter from Dr. D.F. Bezdicek, Soil Microbiologist, Agronomy and Soils Department, Washington State University, Pullman, Washington. January 31, 1980.

Literature Cited

1. Alexander, M. 1961. Introduction to soil microbiology. John Wiley & Sons, Inc., New York, N.Y. pp 23, 66, 92.

2. Fornstrom, K.J. 1978. WEX study. *In:* Wyoming Sugar Beet Research. 1977 Progress Report. Res J 120. pp. 45-47.

3. Vance, B. Darwin. 1978. Agrispon effects on plant growth. (Final report in compliance with contract, N.T.S.U. No. 70271 with Sn Corp., Inc. of Dallas, Texas). Dept. of Biological Sciences, North Texas State University, Denton, Texas 76203. Mimeo (16 pp.)