AGRISPON FAILS TO PROVE CLAIMS IN SCIENTIFIC TESTING

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INTRODUCTION

The product Agrispon[1,2] has been promoted in Western Canada, as well as many other parts of the world, as a product that will decrease the need for nitrogen fertilizer, hasten germination and increase soil organic matter. It was field tested in Alaska using as test crops potatoes, barley and bromegrass (Laughlin et al. 1982a, 1982b). These tests revealed no beneficial influence on the growth characteristic measured. However, there has been considerable interest shown in Agrispon by producers in Western Canada, who have purchased Agrispon quantities to treat in excess of 10,000 ha, with some estimates of 100,000 ha treated.

The Agrispon promoters have suggested that if a crop was supplied with 30% of the normal recommended rate of fertilizer nitrogen (N) as well as Agrispon the yield should be the same as if 100% of recommended N fertilizer was supplied. Considering the major fertilizer N inputs required for crop production, Agrispon, if as effective as claimed, could have been a major breakthrough in crop production. However, no evidence to support the Agrispon claims can be found in the scientific literature.

Studies were undertaken to ascertain the validity of the Agrispon promoters claims. This involved controlled environment soil fertility testing, emergence enhancement testing, microbial content assessment

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[1] Agrispon™ is claimed as an organic proprietary soil supplement and seed treatment manufactured by SnCorp and SnWn Associates, 3601 Garden Brook, Dallas Texas, U.S.A. 75234. This product is also sold with the name Nitro/Max by J & J Agri-Products & Services, Inc., Dillsburg, PA.

[2] Mention of a product by company or name is not an expressed or implied endorsement of that product by Agriculture Canada to the exclusion of other products.

[3] Presented at 1984 Saskatchewan Soils and Crops Workshop.

and soil fertility evaluation under field plot conditions.

MATERIALS AND METHODS

Promotional information provided by the distributor, J & J Agri-Products & Services, Inc., Dillsburg, Pennsylvania and the manufacturer, SnCorp, Dallas, Texas, was used as a guideline for establishment of experiments to test the growth enhancement characteristics of Agrispon. Controlled environment and field studies were undertaken, as well as microbial characterization. Two lots of Agrispon were used; for the indoor studies the Agrispon was supplied by the Food Production and Inspection Branch, Agriculture Canada, from a sample imported by a farm producer; for the field studies the Agrispon was supplied by J & J Agri-Products & Services, Inc., Dillsburg, Pennsylvania, for agronomic evaluation purposes. All studies were undertaken with strict adherance to the label instructions for pesticide application, either 10 days before Agrispon application or 21 days after Agrispon application.

Analysis of the first lot of Agrispon showed that it had a pH of 7.63; electrical conductivity of 8.27 dSm^{-1}; NO_3-N, 810 mgL^{-1}; NH_4^+-N, not detected; total P, not detected; SO_4-S content of 22 mgL^{-1}; K content of 2.3 gL^{-1}; and Cl content of 78 mgL^{-1}. This sample was also analysed for microbial content and type. Agrispon containers were stored at room temperature with samples dispensed aseptically for laboratory and field evaluations.

Full details of the methods used can be found in McAndrew et al. (1984).

DISCUSSION

The controlled environment experiments and field experiments carried out produced the expected results that application of fertilizer N and in some instances fertilizer P increased crop yield. However, Agrispon, marketed as a substitute for, or supplement to the fertilizer N required for crop production had no influence on germination, yield or protein content of wheat or barley. Similar findings with Agrispon have been reported by Laughlin et al. (1982a, 1982b) who reported no response of potato, barley and bromegrass field experiments in Alaska.

There are two possible explanations for the soil biological, and consequently agronomic, ineffectiveness of this microbiological soil supplement:

1) The major types of bacteria contained in Agrispon are common soil inhabitants. According to detailed taxonomic analyses conducted

by Cullimore et al. (1983) 93% of the bacterial population of Agrispon consists of species of six dominant genera with each genus representing at least 10% of the total population. In decreasing order of dominance these genera are Cellulomonas, Arthrobacter, Bacillus, Pseudomonas, Vibrio and Alcaligenes. With the exception of the genus Vibrio, whose members are usually found in fresh or seawater, all genera are known to naturally occur in the soil habitat (Buchanan and Gibbons 1974) and three, viz. Pseudomonas, Arthrobacter and Bacillus, are well recognized as predominant genera in North American soils (Alexander 1961). Consequently, it would be unlikely to expect that the addition of a relatively small number of common soil bacteria could significantly alter the indigenous microbial activities in surface soils.

2) The total number of microorganisms applied via the recommended level of Agrispon soil treatment is too small to have any significant impact on the natural soil microflora. For example, based on our plate count estimate of 2.0×10^6 viable bacterial cells/mL of homogenized product (cf. Table 1) Agrispon treatment at the recommended application rate of 0.935 L/ha will result in the addition of 0.0935 mL of product containing 187×10^3 cells to each m^2 or about 19 cells to each cm^2 of soil surface. Considering that the overall mean number of organisms in the top 2.5 cm of soil under wheat-fallow in southwestern Saskatchewan is about 95×10^6 cells/g (Campbell and Biederbeck 1982) and that a column of soil 1 cm^2 x 2.5 cm deep at a bulk density of 1.2 g/cm^{-3} would contain 3.0 g of soil and a total of about 285×10^6 viable cells then the ratio of the 19 'Agrispon-added' cells to the indigenous soil organisms is about 1 cell to 15 million cells. It is therefore impossible to conceive how the microbiological product Agrispon could either qualitatively or quantitatively affect the indigenous microflora when it is used at such extremely low soil inoculation rates.

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Table 1. Microbiological content of Agrispon

Types of organisms	Number of viable organisms ± S.E.M.* in Agrispon suspension after	
	Manual agitation	Blendor homogenization
Aerobic bacteria, x 10^4/mL	45.7 ± 3.2	201 ± 17
Actinomycetes, x 10^4/mL	n.d.	0.8 ± 0.4
Filamentous fungi, No./mL	13 ± 3	82 ± 27
Yeasts, No./mL	n.d.	44 ± 14
Facultative potentially N^2-fixing bacteria, No./mL	n.d.	0
Rhizobium meliloti, No./mL	n.d.	0

* Standard error of the mean.

n.d. = not determined.

Table 2. Treatments for controlled environment Experiments I and II

Treatment	Experiment	Description
No amendment	I	No amendments
A	I	Agrispon soil treatment at 0.94 L/ha+
P	I	44 kg P/ha
P + A	I	44 kg P/ha + Agrispon soil treatment at 0.94 L/ha
P + A2	I	44 kg P/ha + Agrispon soil treatment at 1.88 L/ha
P + 50 N	I	44 kg P/ha + 50 kg N/ha
No amendment	II	No amendments
P	II	44 kg P/ha
P + A½	II	44 kg P/ha + Agrispon soil treatment at 0.47 L/ha
P + A	II	44 kg P/ha + Agrispon soil treatment at 0.94 L/ha
P + A (foliar)	II	44 kg P/ha + Agrispon foliar applied every 20 days at 0.94 L/ha
P + A + 25 N	II	44 kg P/ha + Agrispon soil treatment at 0.94 L/ha + 25 kg N/ha
P + 100 N	II	44 kg P/ha + 100 kg N/ha

+ In all cases where fertilizer was applied the rate of application was calculated on a pot surface area basis.

Table 3. Growth chamber studies, effect of Agrispon and fertilizers on yield and protein content of wheat

Treatment	Grain yield g/pot	Total dry matter g/pot	Protein dag/kg
		Experiment I	
No amendment	9.4	25.5	8.3
A	10.0	28.3	8.4
P	11.2	29.7	8.2
P + A	10.5	28.1	8.3
P + A2	10.7	29.4	8.3
P + 50 N	13.2	34.0	8.8
LSD (0.05)	0.9	2.5	0.8
		Experiment II	
No amendment	2.2	5.5	7.6
P	2.2	5.7	7.5
P + A½	2.2	5.9	7.3
P + A	2.2	5.9	7.5
P + A (foliar)	2.3	6.1	7.3
P + 25 N + A	2.7	7.0	7.3
P + 100 N	3.8	10.0	7.8
LSD (0.05)	0.2	0.5	0.4

[+]One pot of Treatment P + 100 N was totally lost to smut.

N 3.9 = N 7.8 for Wood Mountain site
P 7.5 = P15 for Wood Mountain site
A = Agrispon seed treatment
a = Agrispon soil treatment

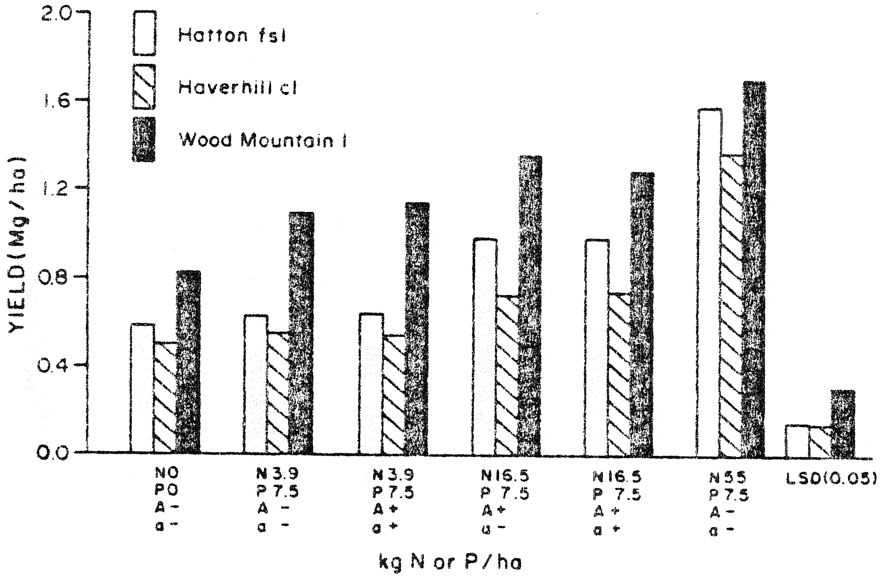


Figure 1. Treatment influence on grain yield at three sites in southwestern Saskatchewan (1984).

a = Agrispon soil treatment

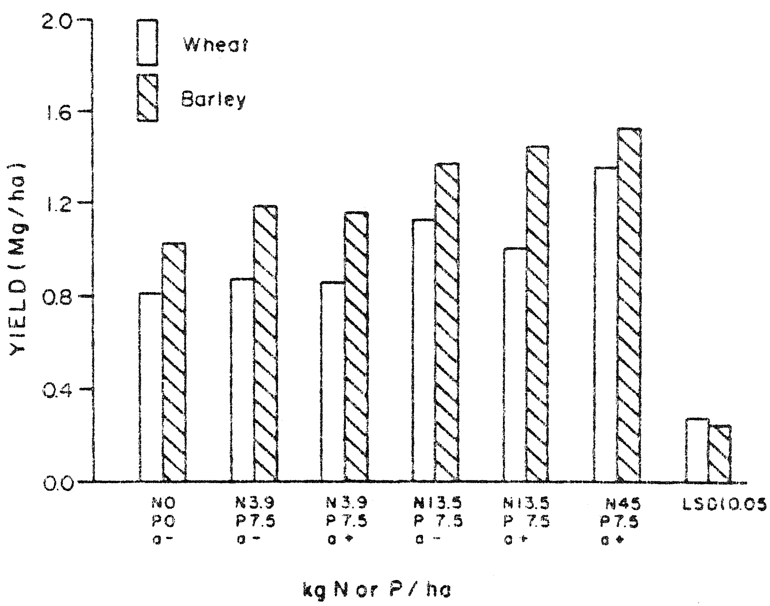
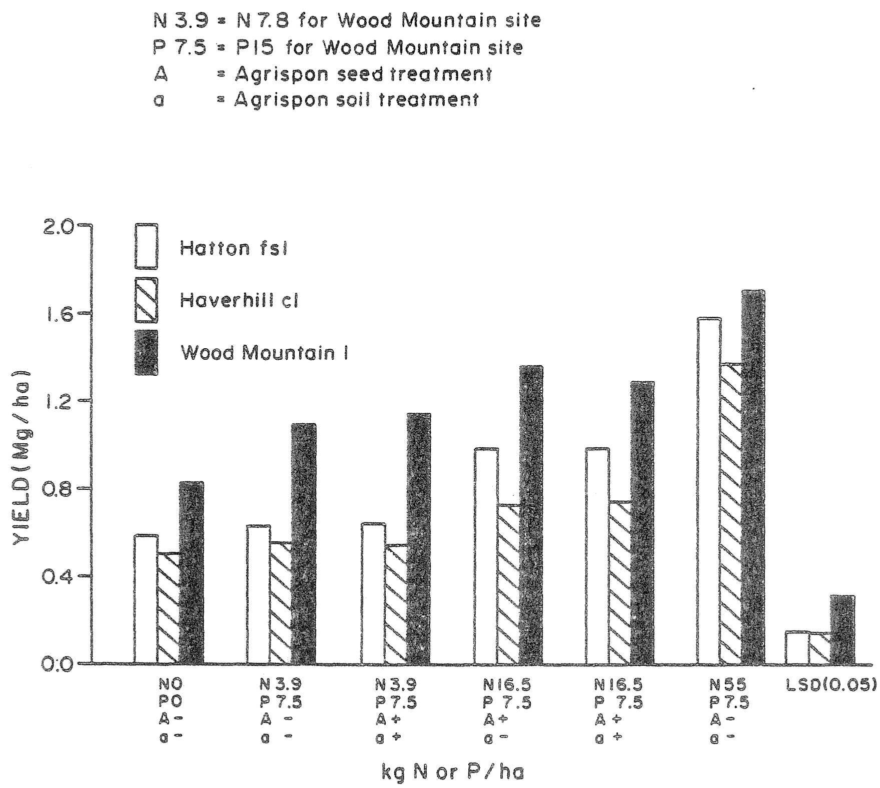


Figure 2. Treatment influence on wheat and barley yield at Swift Current (1984).



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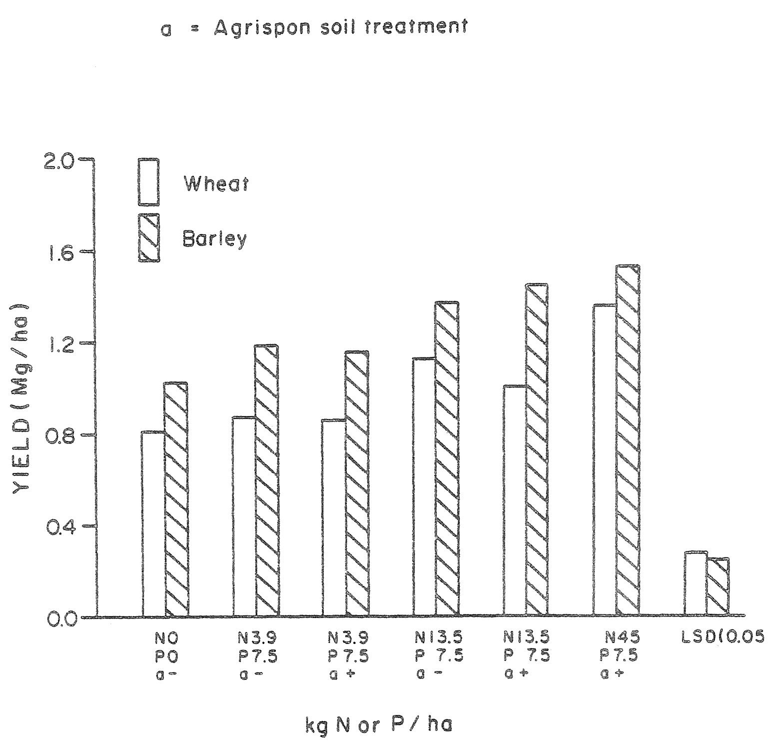

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