Crop growth effects of processed raw materials applied as fertilisers or growth stimulators – a summary of partial EU project results

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***Abstract* - In an EU CRAFT project (COOP-CT-2004-508458) running from March 2004 to March 2006, an international consortium of producers of environmentally benign crop inputs (BFPs: Biological Food for Plants), RTD performers and end users, evaluated the production and use of BFPs manufactured from different raw materials: bovine hides, trees, and herbaceous species. At the manufacturing level, production methods and procedures were reviewed to establish possible relationships between processing steps and end-product quality. At the field level, the BFP products were applied as solid pellets or liquids, as fertilisers or sprays, respectively, on organically grown potatoes and tomatoes and conventionally grown watermelon, cauliflower, strawberries, black currant, raspberries and apples. Evaluations were made of yield, plant health, quality aspects, and environmental effects of the products. In this paper, some Polish crop growth results are presented. In most of the experiments the solid BFP fertilisers did not give positive growth effects additional to those obtained with conventional fertilisers, probably because of the very high fertility levels of the soils used. One of the liquid BFP products applied as a spray performed very well in most experiments. It is concluded that especially liquid BFPs can have very promising effects on crop performance and as such they merit much more scientific attention than what is evident to date.[1]**

Introduction

The EU CRAFT project Biological Food for Plants (BFPs) combines the research capacity of four European research institutes with the practical knowledge of six producers and users of BFPs to develop and test new organic additives for horticultural crops.

Biological Foods for Plants (BFPs) are soil or plant additives which are derived from biological resources. They are produced by extracting 'active compounds', which improve growth or protect against pests and disease, from natural products like leather, seaweed, herbs and pine needles. BFPs reduce the need to use mineral fertilisers, improve crop health, plant disease resistance, and enhance soil quality, and they can therefore decrease farmers' dependency on harmful chemicals.

The BFP project adopted a totally integrated approach to look at problems arising throughout the whole production and use chain of BFPs. Technical research was carried out to look at aspects such as BFP consistency and production efficiency; laboratory research and field trials determined the effects of the BFPs on horticultural crops, soils and diseases, while additional research was done on food quality issues such as the storability and vitamin content of fruits and vegetables produced using BFP additives. In this short paper, a restricted number of crop production results from Poland are presented. Detailed scientific papers will be produced at a later stage.

Material and Methods

In 2004 and 2005, several field trials with several crops were carried out in research stations and farmers' fields throughout Europe.

Each year two experiments were carried out (Exp1 and Exp2) in farmers' fields, designed as one factor Randomized Complete Block (RCB) trials with four replicates and four treatments. Exp1 compared type of fertilizers, whereas Exp2 compared spraying regimes. The treatments in Exp1 were a control with a standard conventional fertilisation practise and three treatments with different BFP fertilizers of which one a compost amendment. In every treatment, identical equivalent values of NPK were applied. In Exp2, all four treatments received a standard conventional fertilizer but at given moments crops were sprayed with either water or a BFP solution. These experiments were carried out with different cultivars (cvs).

At the research stations, experiments were laid out as two factorial split-plot experiments in four replicates, the main factor being the fertiliser treatment, while the subplot factor was the BFP spraying regime. The treatments were as described for the experiments in the farmers' fields, except that instead of a compost treatment, a treatment where no NPK was applied was included (Zero). Also in these experiments several cvs were used.

Results

Strawberries grown in the experiments at the Markiewicz Company in Poland over two years, had better yields with the application of the soild BFP

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fertiliser ILSA-12 treatment compared to the conventional control (Table 1). The reaction of the cv Elsanta to the fertilisers varied more than that of the cv Elkat.

Table 1. Average strawberry production (kg fruit/20 plants) obtained in farmers' fields experiments in 2004-2005 comparing solid fertiliser treatments.

Fertiliser Treatment	Cultivars					
	2004		2005		2004-2005	
	Elkat	Elsanta	Elkat	Elsanta	Total	Rel.Prod.
Control	*2,19*	*2,10*	*8,91*	*8,11*	21,31	100%
ILSA-12	*2,33*	*2,88*	*9,09*	*8,92*	23,22	109%
BF Eco	*2,51*	*2,65*	*8,75*	*6,88*	20,79	98%
BF+ Comp.	*2,31*	*2,14*	*8,79*	*8,41*	21,65	102%

The results over two years of the experiment in which the spraying of different BFPs were compared with water spraying resulted in quite spectacular differences (Table 2). Again it can be seen that Elsanta reacted quite differently to the treatments.

Table 2. Average strawberry production (kg fruit/20 plants) obtained in farmers' fields experiments in 2004-2005 comparing spraying regimes with BFP-liquids.

Spraying Treatment	Cultivars					
	2004		2005		2004-2005	
	Elkat	Elsanta	Elkat	Elsanta	Total	Rel.Prod.
Control	*2,32*	*2,29*	*8,05*	*6,65*	19,31	100%
Ausma	*2,28*	*2,69*	*8,38*	*5,97*	19,32	100%
B!oFeed	*2,49*	*2,31*	*9,95*	*9,28*	24,03	124%
Ilsa	*2,57*	*2,26*	*8,09*	*6,53*	19,45	101%

Results obtained at the experimental station of RIPF, Poland, showed less pronounced differences between treatments, with a decrease in production using the Ilsa spray (Tables 3 and 4).

Table 3. Average strawberry production (kg fruit/20 plants) obtained at the RIPF research station in 2004-2005 comparing solid fertiliser treatments.

Fertiliser Treatment	Cultivars					
	2004		2005		2004-2005	
	Elkat	Filon	Elkat	Filon	Total	Rel.Prod.
Zero	*0,93*	*1,08*	*9,34*	*13,13*	24,48	96%
Control	*0,90*	*1,21*	*10,03*	*13,73*	25,87	100%
ILSA-12	*1,00*	*1,29*	*9,91*	*13,83*	26,03	101%
BF Eco	*0,96*	*1,34*	*9,75*	*13,67*	25,72	100%

Apparently, inherent soil fertility was high, since even with 0 NPK, strawberry yields were comparable with those where the other fertilisers were applied.

Table 4. Average strawberry production (kg fruit/20 plants) obtained at the RIPF research station in 2004-2005 comparing spraying regimes with BFP-liquids.

Spraying Treatment	Cultivars					
	2004		2005		2004-2005	
	Elkat	Filon	Elkat	Filon	Total	Rel.Prod.
Control	*0,98*	*1,13*	*9,74*	*14,37*	26,22	100%
Ausma	*0,93*	*1,27*	*9,79*	*13,67*	25,66	95%
B!oFeed	*0,93*	*1,27*	*9,50*	*13,95*	25,65	97%
Ilsa	*0,95*	*1,25*	*9,99*	*12,38*	24,57	86%

Data on apple trees grown in the greenhouse the first year and in the open field the second, show that all solid fertiliser applications did not clearly resulted in taller trees (Table 5), but that application of B!oFeed sprays did increase tree height significantly (Table 6).

Table 5. Average height of apple trees (cm) obtained at the RIPF research station in 2004-2005 comparing solid fertiliser treatments.

Fertiliser Treatment	Cultivars					
	2004		2005		2004-2005	
	Melfree	Redstar	Melfree	Redstar	Total	Rel.Height
Zero	*126,0*	*97,9*	*184,1*	*166,1*	574,1	103%
Control	*115,1*	*89,3*	*183,9*	*161,8*	550,1	100%
ILSA-12	*112,9*	*76,6*	*187,8*	*154,9*	532,2	96%
BF Eco	*126,4*	*101,1*	*192,3*	*164,6*	584,4	102%

Table 6. Average height of apple trees (cm) obtained at the RIPF research station in 2004-2005 comparing spraying regimes with BFP-liquids.

Spraying Treatment	Cultivars					
	2004		2005		2004-2005	
	Melfree	Redstar	Melfree	Redstar	Total	Rel.Height
Control	*118,8*	*87,1*	*183,4*	*158,8*	548,1	100%
Ausma	*120,8*	*94,4*	*183,4*	*159,2*	557,8	100%
B!oFeed	*122,9*	*86,3*	*200,3*	*167,6*	577,1	106%
Ilsa	*118,1*	*97,3*	*180,9*	*161,8*	558,1	102%

Measurement of trunk diameter showed the same trends as found with tree height (Table 7 and 8)

Table 7. Average stem diameter of apple trees (mm) obtained at the RIPF research station in 2004-2005 comparing solid fertiliser treatments.

Fertiliser Treatment	Cultivars					
	2004		2005		2004-2005	
	Melfree	Redstar	Melfree	Redstar	Total	Rel.Diam.
Zero	*6,7*	*6,13*	*14,1*	*14,3*	41,3	97%
Control	*6,4*	*6,15*	*14,1*	*14,8*	41,4	100%
ILSA-12	*6,4*	*5,45*	*12,9*	*13,5*	38,2	91%
BF Eco	*6,6*	*6,19*	*14,9*	*14,4*	42,1	98%

Table 8. Average height of apple trees (cm) obtained at the RIPF research station in 2004-2005 comparing spraying regimes with BFP-liquids.

Spraying Treatment	Cultivars					
	2004		2005		2004-2005	
	Melfree	Redstar	Melfree	Redstar	Total	Rel.Diam.
Control	*6,4*	*5,75*	*14,0*	*13,9*	40,0	100%
Ausma	*6,6*	*6,05*	*13,5*	*14,1*	40,2	101%
B!oFeed	*6,6*	*5,77*	*15,1*	*15,1*	42,5	108%
Ilsa	*6,5*	*6,35*	*13,5*	*13,9*	40,2	100%

CONCLUSIONS

In the experiments presented, generally solid BFPs performed equal to, but not better than the conventional fertilisers. This is possibly related to the high level of fertility of the soils, as can be deduced from the good results obtained in the zero NPK treatments. The spraying of the BFP B!oFeed often resulted in strong positive effects. Now that it is established that liquid BFPs can have positive growth effects, a logical next step would be to undertake research into the possible mechanisms of activity of this kind of natural crop growth product.

ACKNOWLEDGEMENT

BFPs is a CRAFT Project supported by the European Commission under the Sixth Framework Programme (EC contract COOP-CT-2004-508458-BFPs).