actosol **proven more effective than Vydat; nematicide chemical, in controlling survival & reproduction of Pathogenic Nematodes (*Meloidogyne incognita*) in tomato plants (1).**

The root-knot nematode, *Meloidogyne incognit,* is the most pathogenic nematode parasite of tomato. Nematode infection results in about 80% yield loss in several infested tomato fields (2). Recently, the use of organic acids have been shown to affect nematode reproduction on their host plants by affecting the biochemical defense mechanisms of plants by increasing proteins and fatty acids in root tissues. Such an increase may be involved in synthesizing bioactive compounds able to oppose nematode development and reproductions (3).

Objective**:**
actosol humic acid supplemented with NPK and/or micronutrients (Fe, Mc & Cu) were tested against the root-knot nematode (*Meloidogyne incognita*) in vitro and in vivo on tomato plants and compared with a commercial nematicide, Vydate.

Treatments:
In vitro Treatments:
10 egg masses + 15 mL of from each of the following stock solutions:

1. Water
2. 2 mL ***actosol*** in 1 liter water (low concentration)
3. 4 mL ***actosol*** in 1 liter water (high concentration)
4. 2 mL ***actosol*** + NPK in 1 liter water(low concentration)
5. 4 mL ***actosol*** + NPK in 1 liter water (high concentration)
6. 2 mL ***actosol*** + Micro nutrient (Fe + Mn + Cu) in 1 liter water (low concentration)
7. 4 mL ***actosol*** + Micro nutrient (Fe + Mn + Cu) in 1 liter water (high concentration)
8. 2 mL Nematicide (Vydate) in 1 Liter water (low concentration)
9. 4 mL Nematicide (Vydate) in 1 Liter water (high concentration)

In vivo Treatments:
One-month old tomato seedlings cv. Castle Rock were planted into 15 cm diameter clay pots filled with 3 types of soil including Sandy, Sandy Loam and Clay Soils. The seedlings were inoculated with 2000 Juveniles of *M. incognital*/pot by pipetting the

inoculum in three holes around the root system. One week after inoculation, each soil received 200 ml from each of the following stock solutions:

1. water
2. 10 mL ***actosol*** in 1 liter water
3. 10 mL ***actosol*** + NPK in 1 liter water
4. 10 mL ***actosol*** + Micro nutrient (Fe + Mn + Cu) in 1 liter water
5. 10 mL Nematicide (vydate) in 1 liter water

Plants were then arranged in a fully randomized design in green house at 32 + 5°C and all received similar horticulture treatments.

Results:

1. ***actosol*** supplemented with micronutrients (Fe, Mn + Zn) gave the best results in vitro and in vivo. The treatment gave the greatest reduction in hatching, Juveniles survival and root penetration and reproduction of *Meloidogyne incognita* hatching on tomato.

2. ***actosol*** has proven more effective than Vydate, nematicide chemical, in controlling survival and reproduction of Nematodes (*Meloidogyne incognita*) in tomato plants.

3. The added benefit of application of ***actosol*** alone or supplemented with NPK and/or micronutrients results in significant improvement in the growth of tomato plants. ***actosol*** enhances root growth, enhances nutrient uptake, enhances moisture retention, and increased stress tolerance of tomato plants to nematodes infection.

Reference:

1. Hosny H. Kesba & Mona E. M. Al-shalaby (2008), Survival and reproduction of *Meloidogyne incognita* on tomato as affected by humic acid. Nematology, Vol. 10 (2), 243-249, 2008

2. Barker, K.R., Shoemaker, P.B. & Nelson, L.A. (1976), Relationships of initial population densities of *Meloidogyne incognita* and *Meloidogyne hapla* to yield tomato. Journal of Nematology 8, 232-239.

3. Zaki, M. J, Javad, S., Abid. M., Khan, H. and Moinuddin, M (2004), Evaluation of some chemicals against root-knot nematode *Meloidogyne incognita*. International Journal of Biology and Biotechnology 1, 613-618.

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Field Application Report # 28
actosol *reduced the use of inorganic fertilizers & compost, & increased the yield of Le-Cont Pear trees in the Horticultural Research Institute Orchard in Giza, Egypt*

actosol® reduced the use of inorganic fertilizers & compost, & increased the yield of Le-Cont Pear trees in the Horticultural Research Institute Orchard, at the Agricultural Research Center, in Giza, Egypt

Five years old le-Cont pear trees were grown in clay soil with 3.4 x 4 meters apart under drip irrigation system over 2 seasons (2008 and 2009) at the Horticultural Research Institute Orchard. The objective was to provide evidence that application of ***actosol*** humic acid reduces the use of inorganic N fertilizers and compost and increases vegetative growth, fruit set and yield of le-Cont pears (cv. Le-conte) trees grown on three rootstock (Pyrus betulifolia, Pyrus communis & Pyrus callearyana).

Experimental Design and Treatments: Field trials with split plot were conducted to evaluate the use of ***actosol*** compost, three levels of inorganic nitrogen fertilizers on vegetative growth, fruit set and yield of pears (cv. Le-conte) trees grown on three rootstocks (Pyrus betulifolia, Pyrus communis & Pyrus callearyana). The rootstocks represented the main plots and ***actosol*** and compost treatments represented sub-plot while the N fertilizer treatments represented sub-sub-plot.

1. ***actosol*** *was used at a rate of 60 mL/tree. This amount was divided equally during the following times: at bud burst (late February & early March); after fruit set (Mid April), and Mid May or Mid June of each growing seasons.*

2. Compost was added at a rate of 10 kg/tree at early January of each season.

3. ***actosol*** *was added at a rate of 30 mL/tree plus compost at a rate 5 kg/tree (Time of application was as mentioned above).*

4. Nitrogen fertilizer was added at a rate of 50%, 75%, and 100% of the recommended dose (400 grams N/tree).

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	Rootstock	Amendment	N Levels		
			50%	75%	100%
Plot I	*Pyrus betulifolia*	***actosol*** (60mL/tree)	a b c	a b c	a b c
		Compost (10kg/tree)	a b c	a b c	a b c
		actosol (30mL) + Compost (5 Kg)	a b c	a b c	a b c

Each sub-sub-plot has 3 trees (a, b, & c)

	Rootstock	Amendment	N Levels		
			50%	75%	100%
Plot II	*Pyrus communis*	***actosol*** (60mL/tree)	a b c	a b c	a b c
		Compost (10kg/tree)	a b c	a b c	a b c
		actosol (30mL) + Compost (5 Kg)	a b c	a b c	a b c

Each sub-sub-plot has 3 trees (a, b, & c)

	Rootstock	Amendment	N Levels		
			50%	75%	100%
Plot III	*Pyrus callearyana*	***actosol*** (60mL/tree)	a b c	a b c	a b c
		Compost (10kg/tree)	a b c	a b c	a b c
		actosol (30mL) + Compost (5 Kg)	a b c	a b c	a b c

Each sub-sub-plot has 3 trees (a, b, & c)

Results:
Yield of pear trees was affected by its rootstock as well as compost, ***actosol***, and N fertilizer treatments. Trees grown on Pyrus betulifolia rootstock gave the highest yield of 20.47 (18.19 + 22.76/2) kg/tree followed by yield of 18.30 kg/tree (16.30 + 20.31/2) from trees grown on Pyrus communis and then yield of 12.42 kg/tree (10.49 + 14.45/2) from trees grown on Pyrus callearyana. Over the 2 growing seasons (2008 & 2009) respectively (Table 1)

Yield of pears produced from trees treated with ***actosol*** were 24.18, 21.58, 15.77 kg/tree for the Pyrus betulifolia Pyrus, communis Pyrus, callearyana rootstocks respectively. However, the yield of pear trees treated with compost was 20.86, 18.44, 12.36 kg/tree for the Pyrus betulifolia Pyrus, communis Pyrus, callearyana rootstocks respectively. Comparing with trees treated with compost, ***actosol*** increased average yield of pear trees by 15.9%, 17% and 27% for the trees grown on the same rootstock during the 2009 growing season respectively. Also, there was no significant difference between yield of pears from trees grown on the three rootstocks and treated with ***actosol*** at 75% and 100% nitrogen. Therefore, addition of ***actosol*** not only increases the yield of pears but also reduced the amount of N fertilizer used by 25%.

Conclusion:
The use of ***actosol*** increased the yield of pears from trees grown on Pyrus betulifolia rootstock during growing seasons by 11.8% and 64% over the yield from trees grown on Pyrus communis and Pyrus callearyana rootstocks respectively. Based on the distance between trees (3.4 x 4 meters) used in the current field trails, one acre of land (4,046 square meters or 100 m x 40 m) will contain approximately 234 trees (9 trees x 26). As an example and as shown in Table 1, average yield of pears per tree grown on Pyrus betulifolia rootstock and treated with ***actosol*** was 24.18 kg/tree or total yield per acre is 24.18 kg x 234 trees = 5,658 kg (5.658 tons). However, average yield of pears per tree grown on Pyrus betulifolia rootstock and treated with compost was 20.86 or total yield per acre is 20.86 kg x 234 = 4,881.2 kg (4.881 tons). Total increase in yield of pears from trees grown on Pyrus betulifolia rootstock and treated with ***actosol*** was = 5658 – 4881.2 = 776.8 kg. Based on the statistical data of UN FAO (2010), producer price for 1 ton of pears is $403.4. Therefore, a total gain of $313.3 per acre resulted from the use of 12 liters of ***actosol*** at a price of $34.28, resulting in 9:1 return on investment.

50% N plus *actosol* (Pyrus betulifolia rootstock)

75% N plus *actosol* (*Pyrus betulifolia* rootstock) 100% N plus *actosol*

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Table 1: The use of ***actosol*** increased the yield of pears and reduced the use of N fertilizer

Yield (kg/tree)									
Rootstock	Treatment	N Levels (2008)				N Levels (2009)			
		50%	75%	100%	Average	50%	75%	100%	Average
Pyrus cetulifolia	***actosol***	19.63	19.80	20.54	**19.99**	23.79	24.30	24.53	**24.18**
	compost	16.11	16.90	17.21	**16.74**	19.12	20.55	22.91	**20.86**
	actosol + Compost	17.64	17.84	18.03	**17.84**	23.00	23.10	23.62	**23.24**
	Average	**17.79**	**18.18**	**18.59**	**18.19**	**21.94**	**22.65**	**23.69**	**22.76**
Pyrus communis	***actosol***	17.04	17.28	17.73	**17.35**	20.35	22.15	22.24	**21.58**
	compost	14.07	14.98	15.79	**14.94**	17.11	18.11	20.11	**18.44**
	actosol + Compost	16.46	16.38	16.93	**16.59**	20.64	20.96	21.13	**20.91**
	Average	**15.86**	**16.21**	**16.82**	**16.30**	**19.37**	**20.41**	**21.16**	**20.31**
Pyrus calleryana	***actosol***	11.85	11.94	11.99	**11.93**	15.56	16.07	15.67	**15.77**
	compost	8.57	9.26	10.24	**9.36**	10.70	12.17	14.22	**12.36**
	actosol + Compost	9.23	10.47	10.85	**10.18**	14.84	15.25	15.55	**15.21**
	Average	**9.88**	**10.56**	**11.03**	**10.49**	**13.70**	**14.50**	**15.15**	**14.45**
Average ***actosol*** & compost treatments	***actosol***	**16.17**	**16.49**	**16.75**	**16.47**	**19.87**	**20.84**	**20.82**	**20.51**
	compost	**12.92**	**13.71**	**14.41**	**13.68**	**15.65**	**16.94**	**19.08**	**17.22**
	actosol + Compost	**14.44**	**14.90**	**15.27**	**14.87**	**19.50**	**19.77**	**20.10**	**19.79**
LSD at 5%									
-Roost stock	A	1.56				0.99			
-actosol/compost	B	0.89				0.93			
-Nitrogen Levels	C	0.80				0.88			
	AxB	1.39				1.62			
	AxC	1.38				1.53			
	BxC	1.38				1.53			
	AxBxC	2.39				2.65			

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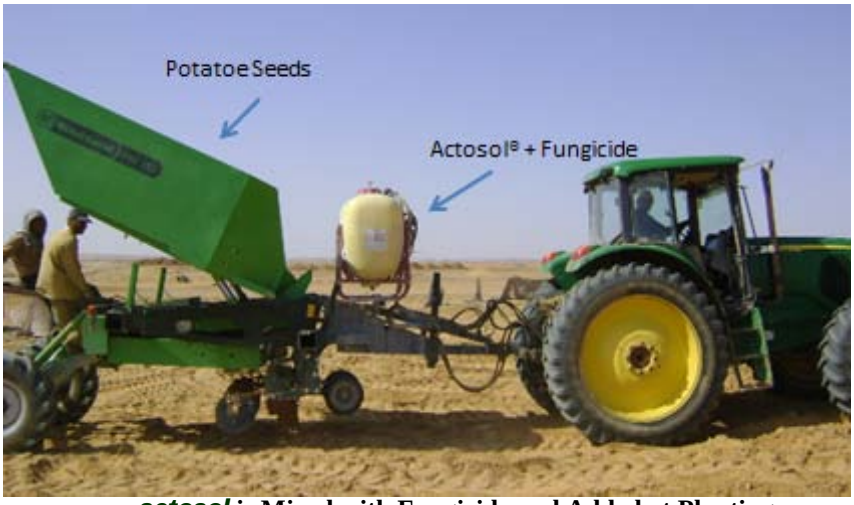
Field Application Report # 27
*Effect of **actosol®** on Quality & Yield of Potatoes in Sandy Soils in Sonac and Farm Frits, Nutron Valley, EGYPT*

Effect of ***actosol®*** on Quality and Yield of Potatoes in Sandy Soils in Sonac and Farm Frits, Nutron Valley, EGYPT

At Sonac farms, field trial was conducted to evaluate the use of ***actosol*** with 6% K on the quality and yield of potatoes in sandy soil. Potatoes tubers (seeds) were planted using planter in an area of 100 Feddans (acres). Under Pivot irrigation system, half of the area was treated with ***actosol*** and the other half was not treated with ***actosol*** (control). All other agriculture practices were the same in the treated and untreated areas. Cultivation was done in November 2008.

actosol *was applied at a rate of 12 liters per acre and was divided into 4 doses:*

1st dose was 4 liters at the planting of the tubers
2nd dose was 3 liters at Ridge (after 25 to 30 days of planting)
3rd dose was 3 liter after 2 weeks after second application
4th dose was 2 liter after 2 weeks after third application



actosol **is Mixed with Fungicide and Added at Planting**

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actosol **is Added at the Time of Ridging**

Results:

Yield showed that untreated area gave 15 tons per Feddan (acre) and the ***actosol*** treated area gave 18 tons per (Feddan (acre). This indicates that there was a 20% increase in yield of potatoes. Similar field trials were conducted at Farm Frits using the same rate of 12 liters of ***actosol*** per Feddan (acre). The following picture shows the increase in numbers of potatoes per plant as compared to the untreated area.

Conclusion:

The use of ***actosol*** increased potatoes yield by 20%. ***actosol*** sold in Egypt at 20 Egyptian pound per liter. The total cost of actosol® added per acre was 240 Egyptian pound (12 x 20 = 240) or $34.28 (change rate is $1= LE 7). Based on the statistical data of UN FAO (2010), producer price for 1 ton of potatoes is $193. Therefore, a total gain of $545 ($579 - $34) per care resulted from the use of 12 liters of ***actosol*** at a price of $34, resulting in 17:1 return on investment.

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Field Application Report # 26
actosol® *Raised the Yield of Rice 15% in Clay Sandy Soils in Kafr El Sheikh, EGYPT*

actosol® Raised the Yield of Rice 15% in Clay Sandy Soils in Kafr El Sheikh, EGYPT

Rice is one of the main crops in Egypt. More than 1 million acre is cultivated with rice in the Nile Delta of Egypt. Filed trial was conducted in Kafr El Sheikh, Egypt to evaluate the use of ***actosol*** with 6% K on the yield of Rice in clay soil of the Nile Delta. Under flood irrigation system, half of the area was treated with ***actosol*** and the other half was not treated with ***actosol*** (control). All other agriculture practices were the same in the treated and untreated areas. ***actosol*** was applied at a rate of 6 liters per acre and was divided into 2 doses. After Tillage (soil plowing) and flooding the field by irrigation water, leveling of the soil was done before setting the young rice seedlings. Before seedlings, the first dose of 3 liters of ***actosol*** was added. The second dose was also 3 liters and it was added 30 days after transplanting of rice seedlings. The following pictures show the method of cultivating rice and applying ***actosol***:

Tilling of Soil

Flood Irrigation

Soil Leveling

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Results:

Yield showed that untreated area gave 13 ardab (ardab = 300 kg) per Feddan (acre) and the ***actosol*** treated area gave 15 ardabs per (Feddan (acre). This indicates that there was a 15% (600 kg) increase in yield of rice.

Untreated ***actosol*** **Treated**

Conclusion:

The use of ***actosol*** increased rice yield by 15% (600kg). ***actosol*** sold in Egypt at 20 Egyptian pound per liter. The total cost of ***actosol*** added per acre was 120 Egyptian pound (6 x 20 = 120) or $17.14 (change rate is $1= LE7). Based on the statistical data of UN FAO (2010), producer price for 1 ton of rice $327. Therefore, a total gain of $179.06 ($196.2 – $17.14) per acre resulted from the use of 6 liters of ***actosol*** at a price of $17.14, resulting in 10:1 return on investment.

Effect of actosol® on plant quality, root & shoot growth, & Nutrient retention of 5 species of Ornamental Liners

The use of plant biostimulants have been investigated by various commercial agricultural organizations and research institutions over the last 15 to 20 years. Crops that have been treated by either foliar or drench applications have shown improvement in root development, increase in vegetative growth and in horticultural food crops higher yields and improved disease to tolerance. The use of Biostimulant are typically classified as a green sustainable product and are derived from Leonardite (carbon source: coal), a rich source of humates. Humates are the living entity of organic matter and results in improvement of stress tolerance, increase in phosphorus uptake, effective chelating agent for improvement of fertilizer uptake, stimulates microbial activity, and reduces salinity thus reduce plant injury.

The objective of this trial/study was to evaluate the effect of actosol, a plant bio stimulant on the effect of plant quality, root and shoot growth and nutrient retention on 5 ornamental liners.

Procedure:
A study was initiated on January 25, 2010 on 5 species of liners growing at Carolina Nursery in Monks Corner, SC. The plants tested consisted of Pieris "Temple Bell", Cephalotaacus Prostrata, Ilex crenat "Steed's". Ilex vomitoria "Pride of Houston" and Mahonia eurybracteata "Soft". Two

blocks of each plant groups were selected growing side by side in an enclosed greenhouse. A treatment of actosol at a rate of 1.5 gallons/75 gallons of water was applied (drench) on January 25, March 9th, and April 26, 2010. On June 30, 2010 samples were selected from treated and non-treated areas of each plant block and plant quality, root and shoot growth was measured (fresh weight) and soil samples were taken to evaluate plant nutrient retention. Plant quality was determined by overall growth of roots and shoots and randomly assigned the following values: 10 best; 7 commercially acceptable, below 7 unacceptable commercially. Shoot and root growth was measured by removing (cutting) roots and washing out the potting media and measuring the weight of the roots. Shoots and foliage were also removed at the soil line and measured based on fresh weight. Soil samples were taken from the plants sampled and nutrient retention and pH taken.

TEST RESULTS:

Plant Quality:

The results from the trial showed that overall quality was the best when plants were treated with actosol. In two plant genera (Cephalotaxus and Mahonia) we considered the plants unacceptable commercially (untreated) compared to the actosol treatment. We noted significantly less root growth in both of the plants.

Root and Shoot Growth:

Results from the trial showed that Pieris, Mahonia, Cephalotaxus, and Ilex "steed", were statistically significant in producing more roots when treated with actosol then in non treated plants of the same plant types. In some cases root weight was 50% more than the untreated. The most notable differences occurred in mahonia, Cephalotaxus, and Pieris. No difference was noted with Ilex vomitoria "Pride of Houston".Results on shoot growth also noted significant differences in 3 of the 5 plant liners. It appears that majority of plants in this test did respond to actosol and that shoot root relationship can be attributed to actosol stimulating roots which ultimately resulted in better shoot growth weight. The combination of both we believe will improve liner production and improve plant growth once transplanted to the planting field.

Effects of actosol on Plant Quality, Vegetative and Root Growth on 6 Liners of Ornamentals

Plant	Plant Quality (1) (grams)		Shoot Growth (2) (grams)		Root Growth (2) (grams)	
	actosol	ck	Actosol	ck	actosol	ck
Pieris japonica "Temple Bells"	9	7	19(a)	7(b)	109(a)	74(b)
Cephalotaxus prostrata	9	3	9(a)	4(b)	74(a)	11(b)
Ilex crenata Steed's "Upright"	8	7	49(a)	46(a)	38(a)	31(b)
Ilex vomitoria "Pride of Houston"	8	7	17(a)	15(a)	20(a)	17(a)
Mahonia Eurybracteata "Soft"	9	5	24(a)	10(b)	50(a)	25(b)

Soil Analysis:
Results from the trial showed that actosol does not increase pH of potting media but does impact nutrient retention of essential nutrient. We noted that phosphorus, potassium and calcium and iron were greater in actosol treatments vs. non-treated. It appears that actosol not only retained the nutrients in the potting media but also makes them more efficient for take up since the plants noted also had better plant quality but also better root and shoot development.

1. Visual quality based on root: shoot relationship. Values based on 10 best; 1 worst; below 7 commercially unacceptable.
2. Based on fresh weight. Measured in grams. Letters within the same species that are different are significantly different statistically.

Effects of actosol® on Nutrient Retention of potting media based on 3 Species of Ornamentals						
	Pieris		**Cephalotaxus**		**Mahonia**	
	actosol	**ck**	**actosol**	**ck**	**actosol**	**ck**
pH	**6.6**	**6.8**	**6.6**	**6.7**	**6.5**	**6.7**
Phosphorous (ppm)	**4.0**	**2.7**	**7.2**	**3.7**	**.9**	**.3**
Potassium (ppm)	**24**	**18**	**22**	**15**	**18**	**12**
Calcium (ppm)	**85**	**83**	**121**	**91**	**83**	**67**
Magnesium (ppm)	**15**	**15**	**19**	**14**	**21**	**15**
Iron (ppm)	**9**	**2**	**8**	**4**	**7**	**3**

Conclusion:
Plants treated with actosol showed significantly improvement in plant growth of the liners which were tested. We also noted better root and shoot growth denoting without good roots there is less vegetative shoot growth. We also concluded that the retention of the nutrients found in the potting media were greater when plants were treated with actosol vs. no-treated thus providing better utilization of fertilizer to the plant liner.

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Field Application Report # 24
actosol® Increased Yield of Flu Cured Tobacco by 17% in Penhook, Virginia

actosol® Increased Yield of Flu Cured Tobacco by 17% in Penhook, Virginia

A field test was conducted in May 2012 at Taylor Amos's 80 acre tobacco farm in Penhook, VA on flu cured tobacco. There were three plots involved in the test, a control with 1000 lbs of 6-12-18 per acre and two other plots with the same fertilizer at time of planting. One with 1 gallon of Bioactivated Base actosol® and the other with 1.5 gallon in the transplant water on the tobacco setter. The results are as follows:

Yield on the control was 2500lbs. per acre

Yield on the 1 gallon plot of Bioactivated Base actosol® added was 2700 lbs. per acre

Yield on the 1.5 gallon plot of Bioactivted Base actosol® added was 3000 lbs. per acre

The 1.5 gallon plot yielded 17% more tobacco, with tobacco bringing $1.75 per lb times 500 extra lbs per acre equates to $875.00 more revenue per acre. The cost per acre to the grower was $24.00 per acre, a return on investment of 36/1, netting the grower $851.00 profit per acre.

Taylor Amos clearly stated that he is going to use 2 gallons per acre on all of his tobacco next year and is going to use it on his current wheat crop this fall of 2012.

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Field Application Report # 23
Field Corn Trial at Cave Hill Dairy Farm in Troutville, Virginia

Comparison of Bioactivated Base actosol® on Field Corn at Cave Hill Dairy Farm in Troutville, Virginia

A field test was conducted at Cave Hill Dairy Farm in Troutville, VA owned and operated by Jerry and Jeff Henderson. A 14 acre field was planted in May of MYCOGEN PMF-918 seed corn. Fertilizer applied was 3600 gallons of manure, 125 lbs per acre of 50-10-10 in the row and 30 gallons of liquid Nitrogen solution (30-0-0) along with Princep and Gramoxone broadcast over the whole field. On 4 acres of the field a ½ rate of Bioactivated Base actosol® was put down with the liquid Nitrogen and the herbicides. A second application over the top was made over the whole field with 40 more units of nitrogen using Coran.

The results were as follows:
Yield for the control was 19 tons per acre.
Yield for the actosol® treated 4 acres was 19.6 tons per acre.

With ensilage having a retail value of $80.00 per ton this equates to $48.00 worth of extra ensilage to the grower. The cost of the actosol® to the grower was $9.56 per acre giving a return on investment of 4-1 or 400%. This was fertile bottom land with a high rate of organic matter and the actosol still paid off. Cave Hills Dairy Farms is under a nutrient management plan and they are limited to how much Phosphorus and Potassium they can legally put down under government regulations which would make it great place to use actosol. actosol® activates the Phosphorus & Potassium that is already in the ground making it available to the plant.

Cave Hill Dairy is going to use actosol on all of their corn fields

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Field Application Report # 22
Corn Silage at Twin Oaks Dairy Farm in South Central Virginia

actosol® Increased Yield by about 12% of Field Corn and resulted in 10 to 1 Investment Gain at Twin Oaks Dairy Farm Fields in South Central Virginia

Field application was conducted in Martinsville, Virginia at Twin Oaks Dairy on substandard land for cultivation of corn silage. Fertilizer was applied at the rate of 600lbs per acre of 9-23-30 with 38 gallons of liquid nitrogen solution (30-0-0) at time of planting supplied by Southern States Martinsville Coop for the control plot. The test plot was fertilized exactly the same but with one gallon per acre of Bioactivated actosol applied along with the liquid nitrogen solution.

Results were as follows: control yielded 17 tons per acre of corn silage. Test plot yielded 19 tons of corn silage per acre thus resulting in increase in yield of 11.76%. Ensilage today being valued at $80.00 per ton thus Twin Oaks Dairy Farm realized additional $160 value. With only extra input cost of actosol of $16, it resulted in gain of 10 to 1. The fertility of the farm soil will also gradually improve from added organic humic matter from the application of actosol. Also the producer noted that ears were much bigger and more developed than in the control plot thus the higher grain content resulting in a higher (TDN) and translating to more lbs of milk produced by his cattle.

Today's farms are rarely all in one piece of land but spread out with fields often miles apart connected only by public roads. Much land is now rented not owned and not in optimal fertility for planting row crops. Often it is not feasible to get the manure truck on these spread out farm land or to spend longer term inputs such as lime or heavy applications of fertilizers when the producer doesn't know how long they will have the land.

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actosol Proven Effective in Improving Germination of Wheat and Seeds

ARCTECH Inc. Agronomist Dr. Michael Cohen put **actosol** to the test for determining its benefits for the coating of wheat seeds. He conducted seed germination tests in a tightly controlled environment using petri dishes (10 seeds per petri dish, 5 replications per treatment, and 10ml of solution per treatment) using water as a control, **Base actosol** at 1:20, and **Base actosol** at 1:40. Results after five days showed that both root growth and shoot development were enhanced with actosol versus the control (water). The best application rate was 1:40 **Base actosol**.

Similarly Prof. Dick Schmidt of Virginia Tech-- some years ago for coating the Turf grass seeds and reported that the turf showed more vigor and as well as resistant to salinity

actosol ®

FIELD TRIALS
Report #20

"Effect of Bioactivated Base actosol® on Solu-Cal Performance on Root Development, Turf Quality, and Nutrient Levels, in St. Augustine Turf

The use of humates to increase root development, plant quality, and improve available nutrients in the soil to the plant has been tested by various university researchers on commercial turf, horticultural, and agronomic crops. The purpose of our study was to evaluate the potential of enhancing Solu-Cal performance when used in combination with a foliar application of Bioactivated Base actosol® sprayed on the pelletized Solu-Cal lime.

Introduction

On November 14, 2011, a test was initiated on established St. Augustine turf. The turf had been fertilized in October with 15-15-15. The following treatments were applied based on a 100 sq.ft /treatment and (based on a 6 pound/1000 sq ft maintenance rate of Solu-Cal) and replicated three times.

1. Solu-Cal .6#/100 sq.ft alone (Check)
2. Solu-Cal .6#/100 sq.ft plus 20 ml of actosol® (6%) sprayed (1:40) on pelletized final product
3. Solu-Cal .6#/100 sq.ft plus 20 ml actosol® (6%) sprayed (1:20) on the pelletized final product

The product was uniformly applied to each plot and water in after application.

OBSERVATION/DATA

On January 3, 2012 the plots were evaluated for plant quality, root development and nutrient retention.
Root quality: Results from the study showed that a combination of Solu-Cal with actosol at the lower rate (1:20) significantly improved root performance. (Table 1.) . It was observed that the fresh weight of the root mass of the actosol® plus Solu-Cal was 50grams vs. 18g for the Solu-Cal treatment along. The combination produced healthier roots and more feeder roots thus giving us a better quality turf. We also noted an improved top turf growth with the higher application of actosol.

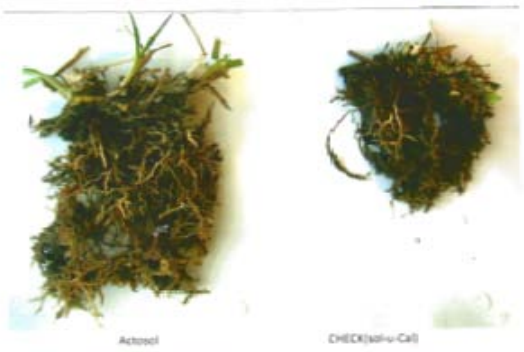
Plant Retention	Solu-Cal (check)	Solu-Cal plus actosol (1:40)	Solu-Cal plus actosol (1:20)
Organic matter	1.0	1.1	1.4
Phosphorous	307ppm	299ppm	247ppm
Potassium	31ppm	16ppm	16ppm
Calcium	705ppm	566ppm	436ppm
Zinc	5ppm	3ppm	2ppm
Iron	157ppm	118ppm	74ppm
Mn	17ppm	4ppm	3ppm
S	72ppm	68ppm	51ppm
SS	.71ms/cm	.65ms/cm	.57ms/cm

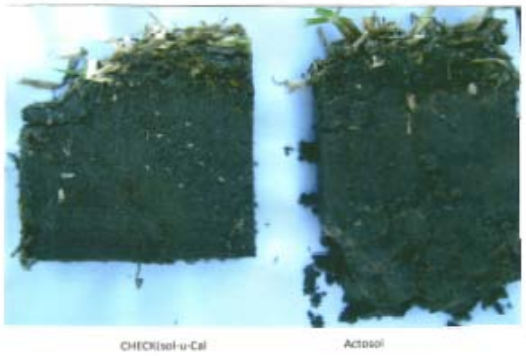
The results from the soil analysis support that actosol improves nutrient uptake into the plant by making more nutrients available to the plant. As the concentration increased of actosol® with the Solu-Cal so did better root development and top growth of the turf (See photos) and lowering of the nutrients in the soil which are been utilized by the plant and not being tied up with other nutrients in the soil.

CONCLUSION

Use of actosol® has shown that when used in combination with Solu-Cal that it improves plant growth, quality, and makes nutrients more available to the plant. Further studies are needed to show how subsequent applications of these two products can have on season long growing of turf and potentially reduce the need for less fertilizer.

Table 1.





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FIELD TRIALS
Report #19

"Effect of actosol® on the growth and soil nutritional content on two varieties of Blueberries

In recent years, commercial growing of both organic and traditional blueberries in northern and central Florida has increased in acreage. With this increase in production, determining improved cultural and nutritional practices are being evaluated to maximize yields. Since blueberries are grown on raised beds and in very sandy soils, it is important to improve organic matter content in the soil along with increasing nutritional retention and CEC in this soil.

actosol®, a green organic bio-stimulant (**a certified OMRI product**) has shown to increase organic matter and improve growth and yield on a number of horticultural and agronomic crops. It has also been shown thru researchers in many countries that bio stimulant improve both macro and micro nutrient retention in especially sandy soils.

A study was conducted at Island Grove nursery, in Island Grove, Florida to evaluate the use of **actosol** (organic bio stimulant) vs. a grower standard program of organic products on two newly planted varieties of organically grown blueberries. The two varieties selected were Meadowlark, and Farthing. Liners were planted on raised beds in April of 2011 and both plots were treated identically as determined with any needed soil additives before the study was initiated.

TREATMENT

On april13, May 2 and June 1, a drench application of **actosol** at 12 oz per plant (equal to 7.5 gallons of **actosol**/300 gallons of water) was applied and replicated on 4/5 raised beds of the two varieties of blueberries understudy. In addition to the **actosol** a fish emulsion (1 gallon/100 gallons of water) was also combined to the actosol to provide equal nutritional levels compared to the grower standard. Soil samples were taken randomly in all beds to evaluate soil nutritional retention, plant quality, and survival rated of the newly planted blueberries.

RESULT
Variety 1. (Farthing)

Results from Table 1 indicated that plants treated with actosol showed a significantly improvement in organic matter using both the traditional method (ck 2.3 vs. 4.4 actosol) of measuring organic matter along with using a more accurate method call LOL (ck 2.6 vs. 4.5 actosol). In relationship to the effectiveness of maintaining (retention) in the soil, actosol maintained a significantly better retention with P, K, Mg, Ca, and Fe then did the grower standard. This is further supported by examing CEC with (actosol 5.4 vs. check of 3.8). In evaluating the plant quality of actosol vs. grower standard, actosol had significantly fewer plant losses than did the grower check. We believe that these plants had less stress (higher organic matter better water holding capacity) and better nutritional levels available during this period when the liners were planted. No significant differences were noted in pH of the soils as related to treatment. Plant quality was significantly better and less plant losses occurred with plants treated with actosol vs. the grower standard.

RESULT
Variety 2. (Meadowlark)

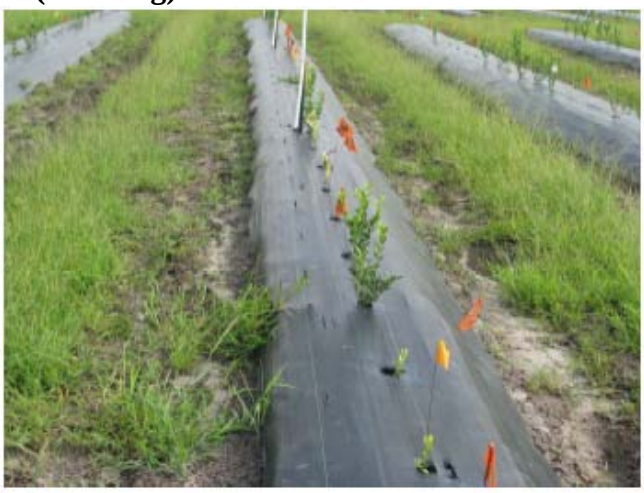
Our study showed similar results compared to variety 1, that when actosol treatments were made on this variety, there was an increase in organic matter content using the LOL and colorimetric method. We also noted that there was a similar response in maintaining a higher level of nutrient retention in the soil with actosol vs. the grower stand. Our study also showed actosol improved CEC (actosol 7.9 vs. check of 3.9). As noted in both varieties the soil pH was not significantly influences with actosol. Plants treated with actosol showed greater root development and better top growth with less plant losses.

CONCLUSION
A study was conducted in the spring of 2011 using **actosol** on two newly planted varieties of organic blueberries. Our study showed that actosol improved organic matter content in the soil along with improving nutrient retention in the soil resulting in better plant growth and in lower mortality levels. actosol treated soil also increased CEC but had no influence in pH.

Effect of actosol® on Organic Matter and Soil Nutrient Content on two varieties of Blueberries Island Grove

	Variety 1		Variety 2	
	Check	**actosol®**	**Check**	**actosol®**
Organic Matter				
Soil LOL	2.6	4.5	3.1	3.7
OM (colorimetric)	2.3	4.4	3.1	4.0
Phosphorous (ppm)	77	146	112	356
Potassium (ppm)	139	189	155	150
Magnesium (ppm)	63	73	59	112
Calcium	492	736	792	852
Soil pH	6.5	6.4	5.8	6.0
CEC	3.8	5.4	3.9	7.9
Iron (ppm)	55	65	49	79
Manganese (ppm)	3	3	3	3
Souble Salts	.78	.62	1.2	.95

Variety 1(Farthing)



actosol® **check**

Variety 2 (Meadowlark)

actosol® **check**

actosol ®

in ACTION REPORT #18

Kidwell Organics: Sod with Enegra actosol®

Kidwell Organics, Baskerville, Virginia

Kidwell Organics is the largest Turf Grass growing farm which is supplying to the high performance athletic fields. Mr. Roger Tisdale showed the application of Enegra actosol®, product of Actodemil® technology for the recycled explosives. He showed that the grass was greener and less wilting especially during this unusual high temperature approaching 115 °F and drought conditions.

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actosol ®

in ACTION REPORT #17

Hat Hudson Farm: Organic Tobacco

Hat Hudson Farm in South Hill, Virginia

Mr. Glen Hudson, the third generation farmer has the largest organic Tobacco farm in Virginia. He farms 5,000 acre in five different counties for both Soy bean and Tobacco. His farm manager, Mr. David Trujillo for past 25 years gave tour of this farm in scorching heat with temperature of about 115 °F (46 °C). He showed how the use of actosol® is helping these Tobacco plants cope with this stress condition. They use 2-3 gallons per acre at the time of transplanting the plants. One of the important points he made is the actosol® treated plant had no flowers which take up too much of water, thus Tobacco leaves grow bigger. They use granular fertilizer (8-16-24) at a rate of 500 lbs per acre and then liquid nitrogen (30-0-0) at 7 gallons per acre.

Mr. Trujillo also proudly showed his vegetable garden that how actosol® was benefiting his vegetable garden. He is growing green tomatoes, green beans, which usually have only two pickings, but with actosol® treated he already picked five times and they are still coming out.





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actosol®

in ACTION REPORT #16

Lawson Farm- Land Repair & Wheat, Soybean, Corn, Tobacco and Milo

Lawson Farm, Gordonsville, Virginia

Mr. Robert Lawson has been using actosol® for growing Wheat, Soybean, Corn, Tobacco and Milo (Sorghum used for animal feed, bread making and whiskey) and also showed photos of areas treated with and without actosol® showing astonishing improvement from 50 bushels per acre to 100 bushels per acre. He applies 1.5 gallons of actosol® per acre in Fall and 1.5 gallons of actosol® per acre in Spring. The protein increased by 3.5 percentage points. In case of Corn, he reported that he is obtaining 30 times values than the cost of actosol®. In case of Tobacco, his gain is 12 times more than cost of actosol®. Mr. Lawson also shared that he is able to repair the land using actosol® in 18 months compared to generally it was taking him 5 to 10 years. He showed photos of his Winter Wheat Fields treated with actosol® which he claimed do not go into dormancy and remained green with snow.

Farmer Lawson also uses actosol® for his vegetable garden. He pointed out to the Turkish visitors that his one meter high tomato plants have become an important therapy for his 85 years old ailing mother, who checked them out these astonishingly tall plants every morning. Visitors from Turkey






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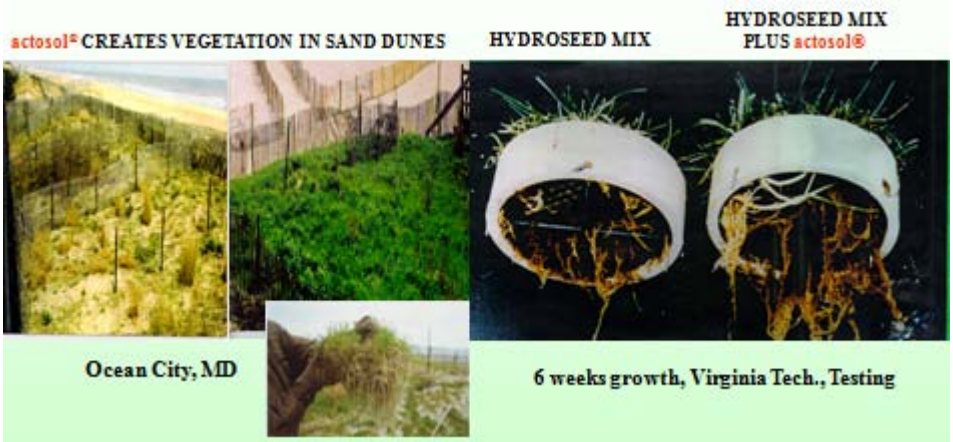
actosol®	**actosol® Facilitates Crops and Plant Growth in Soils and Water with High Salinity** **FIELD TRIALS Report #15**

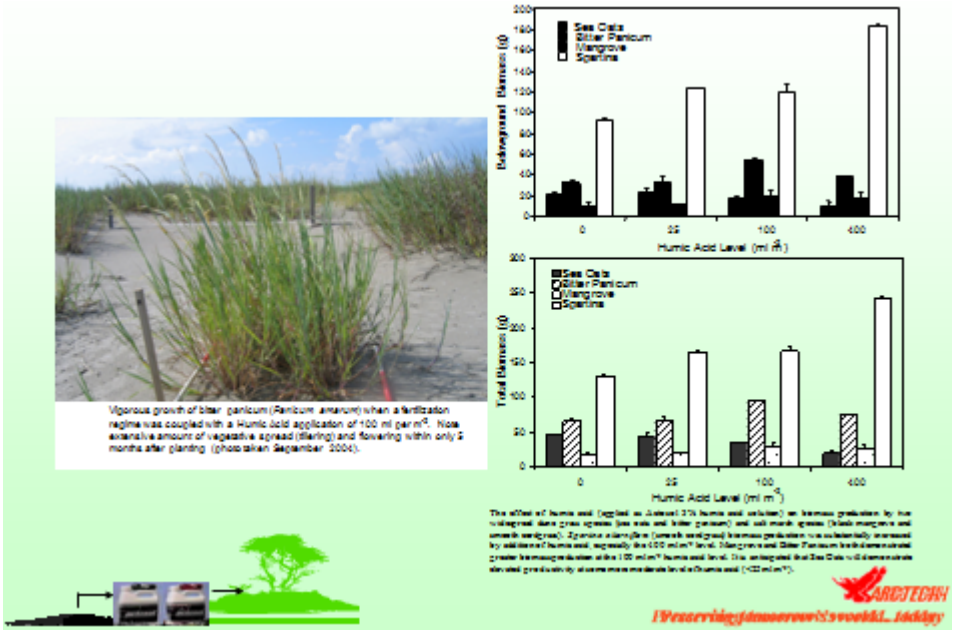
actosol® Successful Applications for Increased Crop Production and Plant Growth in Soils with High Salinity and Water with High Salinity

High salinity of as much as 2000 ppm in soils and in irrigation water inhibits the uptake of water by the plant due to increased osmotic pressure, which results in water moving from the plant to soil and thus the plants become desiccated and growth is severely inhibited. High Sodium also exchanges with potash and other cations in the clays and sodium clays being very fine particles result in forming compact soils and severely decreases its infiltration properties and thus limiting the water, air movement in the soil and as well as retard the root growth. The adverse impacts of high salinity have become a major challenge in maintaining fertile soils and grow crops and sustain vegetative growth. The unique properties of a proprietary formulation of organic humic acid in the actosol® has been successfully proven in mitigating the above adverse effects of salinity and increases the crop yields and as well as maintain vegetative growth in several applications as described below:

1. BEACH SAND DUNE IN OCEAN CITY, MARYLAND AND GULF COAST ON MARSH LAND IN LOUSINIA USA: The beach sand on the shores of Ocean become highly enriched in salt during the repeated highly saline water encroachment and evaporation. Thus hardly any vegetative growth can be sustained on the beaches. Actosol® at a rate of 5 gallons per acre was applied as part of the hydroseed mix (recycled wood fiber mulch, biodegradable tack, seed mix of 1/3 perennial rye,1/3 grain rye and 1/3 K-31 fescue at 10 lbs/1000 square feet). Germination resulted in three days and within 10 days the entire dune was covered in lush green growth. Approximately a month and half later, samples were taken from the test site. The root development was foot and half deep and massive as shown in the photo below**:**



Prof. Mark Hester now at the University of Louisiana conducted field tests with actosol® to evaluate its effectiveness on growth of four varieties of commonly grown sea grasses on marsh lands in Louisiana for coastal land restoration. actosol® was tested at four dosage rates. Results shown below support that the application of actosol® resulted in enhanced growth of both root biomass and top growth. Details of Prof. Hester study are published in the Journal of Coastal Research v.24, March 2006.



2. EGYPT: Dr. El Shall Saad, an agriculture/horticulture expert in Egypt has been helping farmers in using actosol® in growing fruit crops in the desert land areas of Egypt. In these areas the farmers depend up on highly saline water from ground water and as well as the sewage water for irrigation. This has been resulting in decrease in crop yield and as well as impairment of the soils by salt encrustation and as well decrease in the infiltration of the soils. Dr. Saad has successfully assisting the farmers in Egypt in reversing these adverse impacts and improving the development of root mass with applications of actosol® at 2-3 gallons per acre added to the saline water in the drip irrigation lines and as well foliar applications. The unique properties of humic acid and formulated into specific formulation in actosol® are assisting in sustaining robust plant growth in desert land soils in Egypt containing as high as 16,000 ppm salt concentrations.

The increased root mass development is shown in Photo below and application of actosol® through soil and foliar on mango trees almost doubled the yield as shown in the Photo below.

3.WYOMING: Mr. Robert Downey of Energy Ingenuity of Colorado demonstrated the use of actosol® to J.M. HUBER Inc. , a leading coal bed methane producer in Wyoming who was faced with costly disposal of high salinity water produced during the production of gas by dewatering the coal seams. The producer water contained high salinity resulting into 50+ SAR (Sodium Adsorption Ratio) compare the regulatory limit of 10 allowed for land disposal. Mr. Downey installed a field unit consisting of a chemical pulse pump and a turbine flow meter mounted on a small skid for automated metering in actosol® into the produced water prior to irrigation of the adjoining land area. actosol® was metered in to add only 50 ppm into the water during the 30 days of the 45 days of test period. The control area received only produced water without any addition of actosol®. The test area showed lush green vegetative growth without any bare spots compare to the control as shown below in the Photo. The treatment costs based on $10 per gallon of actosol® resulted in $0.02/barrel 9 42 gallons). A typical CBM well in Wyoming produces 500,000 to 1,000,000 barrels of water in its 7-10 years lifetime. This represents a total cost of about $10,000-20,000 for lifetime or only $1,000-2,900 per year.

Amazingly, the growth rate of the alfalfa and wheatgrass was significantly better – thicker, taller and a much darker green color - in the plot where the Actosol-Z™ was added, even though only about 25% of the prescribed 100 ppm concentration of Actosol-Z® was actually applied. This is also evident in the photos below, where the agricultural consultant is shown collecting alfalfa and wheatgrass samples for analysis.

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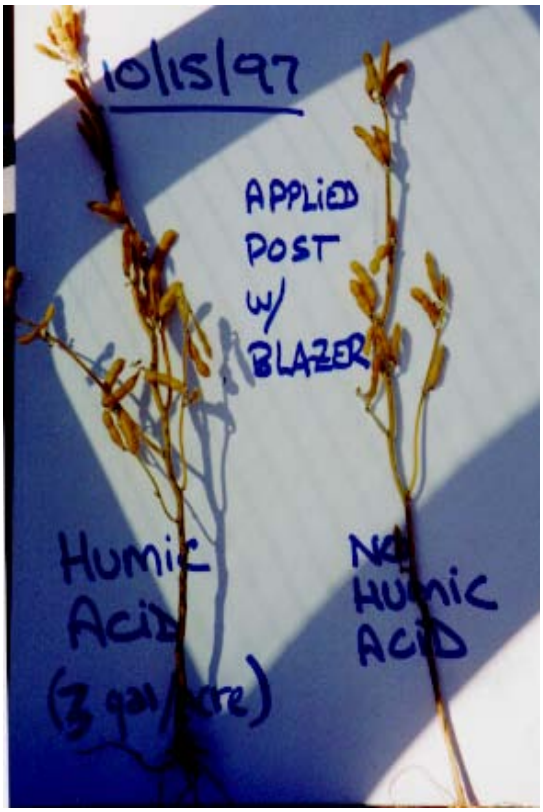
actosol®	**actosol® Benefits in Combination with Herbicides FIELD TRIALS Report #14**

actosol® in Combination with Herbicides and Glyphosate (Roundup) for GMO Crops Proven Beneficial for Increasing Crop Yields, Low Cost and Environmental Protection

Field Crop tests by Mr. Paul Bodenstein, Agronomist in Virginia with actosol® in combination with herbicides (Blazer, Cobra, Pursuit or Typhoon) and Roundup and by Prof. Dick Schmidt with Banner (Trizol Fungicide) for control of disease on Turf.

SOYBEAN

actosol® was applied at a 550 mg/L concentration (1.1 lbs./acre) in a foliar application with a post-emergence application of Blazer (acifluorfen) herbicide, surfactant and manganese. The soybeans were in the fourth trifoliate. Blazer was used because of its low cost and the broad spectrum of weeds that it controls. Blazer is notorious for stunting and causing phytotoxicity of soybeans. This "phyto" problem is exhibited by a spotting of the leaves and is usually outgrown within 20 days, given normal conditions. In the plot, observed two weeks after treatment, the soybeans treated with the actosol® had continued growing and had progressed to the eighth trifoliate while the soybeans sprayed with the Blazer without actosol® were just beginning the fifth trifoliate. This turned into an ***increase of* 6.8 *bushels per acre*** by using actosol®.



An at-harvest photo showing the growth differences and pods set of soybean plants treated with actosol® when spraying with Blazer. The soybeans on the left yielded 6.8 more bushels than the soybeans on the right.

Approval of actosol® Humic Acid

A. USDA National Organic Food Production Program
October 21, 2002
Allows use of Humic Acid for Growing Organic Food
Additional Info : www.ams.usda.gov/nop

B. US Environmental Protection Agency
June 13, 2003
Approves Humic Acid as Environmentally Safe and Exempts from Tolerance Requirement when Used as an Ingredient (adjuvant, UV protectant) in Pesticide Formulations
Additional Info : www.epa.gov/fedregstr

C. OMRI Listed (Organic Materials Review Institute)
February 18, 2005
Additional Info : www.omri.org

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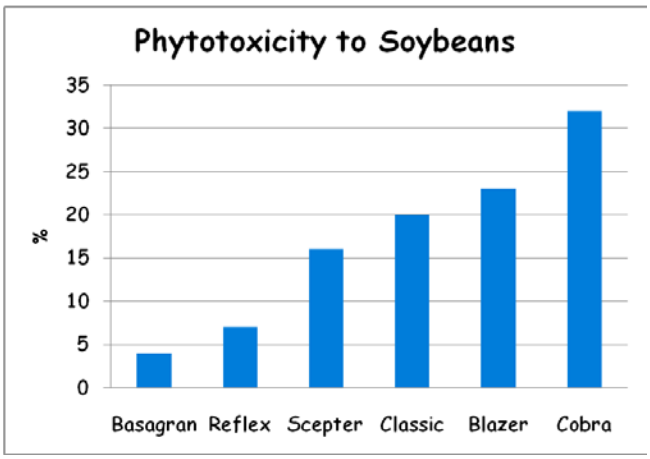


actosol® is working as a safener for low cost weed-control chemicals, such as Blazer, Storm and Cobra. This allows farmers to use low cost, low-residual chemicals while avoiding the heavy "burn" normally associated with these chemicals. If we look at the chart provided by Zeneca Ag Products, we can see how certain postemergence soybean herbicides cause phytotoxicity to soybeans when applied at labeled rates. The soybeans usually outgrow this "phyto" in a normal year where soil moisture is adequate. But in many years, soil moisture conditions cause plant stress and can reduce yields. When we added the actosol® to postemergence spray, this “phyto" has either been eliminated or reduced. Even when the burn on the leaves was visible, the plants never stopped growing.

In a Roundup-Ready system, a postemergence application is used. Adding actosol® to postemergence herbicides along with small rates of pyrethroids has lowered these pest levels in soybeans. The major pests that cause the most damage in the Mid-Atlantic are; stinkbugs, corn earworm *(Heliothiszea),* alfalfa leafhopper, bean leaf beetles and soybean thrips *(thrips are the vector for the disease known as Bud Blight, which can reduce yields by 25% to 100%).* Adding actosol® a soybean Roundup spray enhances foliar fertilizer penetration into the plant. Over 2,000 acres of soybeans were sprayed with Roundup, Karate, EDTA manganese and actosol®. Many acres were sprayed with Blazer, Cobra, Pursuit or Typhoon in place of the Roundup. The actosol® rate was one gallon per acre. Soybean growth was accelerated where the actosol® was applied.

CORN

The benefits of actosol® in corn field was found to be similar to soybeans. As problem weeds arise, such as triazine-resistant pigweed and lambsquarter, field bindweed and climbing milkweed, growers are incorporating post-emergence sprays into their corn herbicide programs. Just like soybeans, these chemicals have the potential to stunt or stress the young corn plants. Pioneer and Dekalb seed corn companies have published lists suggesting avoidance of some postemergence materials. actosol® was shown for reducing or even eliminating the stress caused by these chemicals.

In Henrico County, VA, we placed actosol® in a replicated plot where we sprayed Accent, a DuPont postemergence grass herbicide, with three different rates of actosol®. The rates were one, two and three gallons compared to no actosol®. We were attempting to control Johnsongrass. The grower harvested the plots before we could get yield data.

BARLEY AND WHEAT

Cereal crops planted in the Mid-Atlantic region of USA are planted in the fall when soil temperatures and soil microbial activity are in decline. These decreases result in less available phosphorous in the soil requiring the addition of phosphorous to ensure availability for adequate plant growth. actosol® humic acid products stimulate soil micro-organisms and enhance P solubility. Adding actosol® to small rates of nitrogen should allow growers to reduce or eliminate P rates in the fall on "high" and "very high" P-testing soils.

In the fall, Mr. Paul Bodenstein of Ag. Systems, a Virginia crop consulting firm, applied actosol® with a full rate of fertilizer to barley and at a half-rate to wheat to determine the effect of actosol® in reducing or eliminating excess fertilizer costs. Application rates at the test plots were three gallons per acre.

Two barley test plots averaged 102 bushels per acre at harvest. In a separate trial, actosol® was applied at the rate of one gallon per acre, with the second spring nitrogen application to determine of "foliage burn" would be impacted. Visible results were achieved with "burn" noticeably reduced. Test plots were replicated and yields recorded at harvest. Plots treated with actosol® averaged 101.5 bushels per acre compared to untreated plots which yielded 96.3 bushels per acre. Foliar applications of actosol® increased barley yields by an average of 5.2 bushels per acre.

Two separate wheat plots were also planted and tested. The first test plot was planted at rates of 30 lbs. of nitrogen, 70 lbs. of phosphates, 100 lbs. of potash and three gallons of actosol® per acre. Yield at harvest averaged 67.74 bushels per acre. The second test plot was planted at a rate of 30 lbs. of nitrogen, and a "half-rate" of 35 lbs. of phosphates, and 50 lbs. of potash. The results at harvest indicated an increase in yield over the "full rate" test plot of 2.52 bushels at 70.26 bushels per acre.

UNIVERSITY STUDIES_KENTUCKY BLUEGRASS

Results by Professor R. E. Schmidt, Department of Crop and Soil Environment Sciences, Virginia Tech, VA shows astonishing synergistic benefits in root growth when combined with Banner as well as effective disease control at the half the rate of normal application. Following photo by Prof. Schmidt speaks for itself.

actosol®

FIELD TRIAL
Report #13

"Effect of Base *actosol*® on Root Development, Plant Quality and Nutrient Retention on Tobacco Plants"
Hope Farm, Clinton, North Carolina 2009

The use of humates to increase root development, plant quality, and potential yields has been tested by various university researchers on commercial agronomic and horticultural crops. The purpose of our study was to determine the effect of Base actosol on root development, plant quality, and nutrient retention on commercially grown tobacco.

On March 20, 2009 a test was initiated applying *Base actosol* to float bed (12.5 gallons of actosol/500 gallons of water) growing tobacco seedlings (288 cells/tray) in a greenhouse at Hope Farm, in Clinton, NC. An identical bed of tobacco seedlings was not treated (grower standard). Seedlings of both treatments received the same liquid fertilizer in the float beds while in the greenhouse until April 17th, 2009. Plants/Seedlings treated with base actosol in the greenhouse were then transferred to the field where they received an application of *Base actosol* in the transplant water (2gallons of actosol/acre in 80 gallons of water). A second group of seedlings which did not receive any actosol in the greenhouse (grower standard) were transplanted to the field and only received water at planting. Both groups received the following fertilizer during the testing period. Fertilizer treatments included 200 lbs/acre of 15.5% calcium nitrate on April 24 followed by 700lbs /acre of 8-4-24-13.2S-4.9Mg with Avail approximately May 13th. Observations were made and data were collected on July 7th and Aug 12th. Soil samples were taken on both dates. Ten replications were made of each treatment.

OBSERVATIONS/DATA:

Root Development. Observation from this study showed that *Base actosol* treatments significantly improved root development compared to the grower standard. Based on our observations Base actosol also increased fibrous feeding roots (Fig.1) and (Fig.2) compared to the grower standard and thus we noted improved top growth and quality of the tobacco.

Figure 1 **actosol®**

Figure 2 **control**

Plant Quality. It showed an increase in plant height and improved in color and quality of tobacco plants (Fig. 3) treated with base actosol vs. grower standard. Average height of tobacco plants treated with actosol showed a 10% increase in plant height compared to the grower standard. Measurement of height growth for this study was calculated from the base of the plant to where it was topped. Based on these two criteria, there is a strong correlation between improvement in root development and its impact on vegetative top growth and plant quality.

Figure 3

Nutrient Retention. The study showed that *Base actoso*l improved nutrient retention in sandy soils in which this study was conducted compared to the grower standard. (*Table 1)* The results show that base actosol doubled the organic matter content and retained more phosphorous, potassium, magnesium, calcium, and zinc content in the soil compared to the grower standard.

Effects of *Base actosol* on Nutrient Retention and Organic Matter Content in Sandy Soils, Clinton, North Carolina

Treatment	Date	O.Matter	P ppm	K ppm	Mg ppm	Ca ppm	pH ppm
actosol	July 7	1	175	34	48	315	6.2
Grower Standard	July 7	0.5	179	37	55	370	6.3
Actosol	Aug. 12	0.9	165	47	48	327	6.1
Grower Standard	Aug. 12	0.5	147	38	33	249	5.9

Table 1

RESULTS/CONCLUSION:

Results showed that ***Base actosol*** when used in both float beds in the greenhouse and transplant water at planting provided improved root development, plant quality, and greater nutrient retention in sandy soils in growing tobacco at Hope Farms in Clinton, NC. It should be noted that during the months of June and July weather conditions were not typical and excessive rainfall occurred thus further indicating that *Base actosol* provides a significant opportunity for growers in these types of soils to increase their quality of tobacco crop and also increase the yields.

actosol®

FIELD TRIAL
Report #12

"Effect of Bioactivated Base actosol® on Turf Root Development and Turf Quality"
Woodlief Turf Farm, Rolesville, North Carolina 2008-2009

A field trial was conducted to evaluate the use of *Base actosol* on established fescue turf for sod production during the spring of 2009. The objective was to compare applications of *Base actosol* to grower standard program and determine its effect on root development (root quantity) along with overall top growth and density of turf.

OBSERVATIONS/DATA:

A planting of fescue seed was done on September 15, 2008. Seeding was at 400#/acre and 12-24-20 fertilizer was incorporated at a rate of 400#/acre at planting. A second application of 18-7-12 was applied at 300#/per acre in the spring of 2009. On February 16th and March 24th, application of *Base actoso*l was applied at 3 gallons/60 gallons of water per acre as a foliar application. One acre plots were used. Evaluation of root quality and overall turf growth and color were measured on June 9th. Soil analysis was also taken to determine organic matter and nutrient retention of nutrients in the soil.

RESULTS/CONCLUSION

Results from the study showed that *actosol* increased both quantity and length of roots. Plants treated with *actosol* average 4.5 inches in length vs. 2 inches for the control (**Fig. 1 and 2).** In reference to turf quality *actosol* treatments provided better density due to improved root development. This study supports university trials that *actosol i*ncreases tensial strength of turf resulting in higher profit to growers due to less loss of sod during harvesting. Finally, turf color in both treatments was comparable.

actosol **control**

Figure 1

Control **actosol**

Figure 2

actosol®

FIELD TRIAL
Report #11

"Effects of Bioactivated Base *actosol*® on Root Development, Plant Height and Seed Count/Head on Wheat"
Woodlief Farms in Rolesville, North Carolina, 2009

A field test was conducted to evaluate the use of *Base actosol* on established wheat plants (Southern States 8308 variety) during the spring of 2009. The objective was to compare applications of *Base actosol* to non-treated grower standard program and determine its effect on root development, plant height, and seed count/wheat head.

Wheat seed of SS 8308 were planted on Nov. 14-18 2008. No fertilizer was applied until March of 2009. The rate of spring fertilizer was 100 units of a 24% nitrogen. Plants were grown under non-irrigated growing conditions. On February 16 and March 24th 1.5gallons of *Base actosol* /40 gallons of water per acre were applied overhead. Plot size consisted of 1 acre for each treatment. Both treatments received the identical amount of fertilizer and all other growing conditions were the same. Evaluation of root development, plant height, and seed count per head were measured on June 9, 2009. Harvesting of the crop occurred on June 17-20, 2009. Data collected from the study consisted of 10 replication within the field for each treatment.

TREATMENTS:

1. Base actosol two times at 1.5gallons/40 gallons of water per acre
2. Grower standard (Control)
   Both treatments received the identical amount of fertilizer and all other growing conditions were the same.

OBSERVATIONS/DATA

Root Development. Observation from this study showed that *Base actosol* significantly improved root development compared to the grower standard treatment. The actosol treatment showed improvement in both root mass and in root length compared to the grower standard as shown in Figure 1 and Figure 2

control **actosol®**

Figure 1

actosol® **control**

Figure 2

Plant Height. Evaluation of shoot height of wheat plants that were treated with *actosol* averaged 27-28 inches vs. grower standard of 22-23 inches as shown in Fig. 3. It was also noted that the length of the shoots correlate closely to the length of the seed head.

Figure 3.

actosol® **control**

Seed Count/Head. Evaluations of seed count /head were determined by removing the individual seeds from each head and counting the total seeds and weight of the seeds per head. Ten replications were made from each treatment. Results showed that the use of *actosol* averaged 44 seeds per head vs. 21 for the grower standard. We also observed that the weight of seeds per head averaged three times as great 2.2 grams vs. 0.8 grams for the grower standard as shown in Fig. 4. Visual observations also noted that seeds which had received actosol were fuller and larger in girth.

Figure 4.

actosol® **control**

RESULTS/CONCLUSION

Results showed that ***Base actosol*** does increase root development, shoot length, and seed count/head. In relationship to calculating a estimate of yield difference between actosol vs. the grower standard we calculated the estimated yield by multiplying the average heads per foot(30) by the average number of kernels per head(44 actosol vs. 21 grower standard) The results was 1320 vs. 630. We then divided this number by 12(rows spacing in inches) which was 110 vs. 53 and then multiplied it by .48 to arrive at a estimated yield of 53 bushels for actosol vs. 25 bushels for the grower standard. This is a 112% increase in yield per acre. It should be noted that this grower did not fertilize at planting and

weather conditions were not typical of a average growing season. Based on this geographic area yields for the 2008-2009 growing season ranged from 25 -60 bushels and based on this farmers soil type and growing conditions they would consider 40 bushels per acre to be extremely good. Based on the increase in yield and the wheat currently selling at average $4.00/bushel the farmer realized a gross profit $112.00 per acre minus $36.00 per acre cost for actosol thus net profit per acre to the farmer was $76.00. This is a significant gain for the farmers thus improving their overall income of farm operations which otherwise have been very marginal due to decreasing crop yields and lower crop prices.

actosol ®

FIELD TRIALS
Report #10

"Effects of *calcium actosol*® on Root and Turf Growth Under High Salinity Conditions on Beach Area"

Symsi Manuel, April, 2008

In the spring of 2008 a test was conducted to evaluate the use of ***calcium actosol*** on one entertainment beach area. The objective was to demonstrate that *calcium actosol* could improve turf performance on highly compacted soils and improve Bermuda grass turf.

Application of *calcium actoso*l at the rate of 3 gallons per 60 gallons of water was used to cover the turf area. The first application was made with a hand held power sprayer and then the second application was applied with a bloom sprayer. Application was made to the left of the stage and in front of the stage (approximately 8-10 feet).

Soil sample was taken at the beach entertainment area to evaluate the effectiveness of chelating of nutrients, organic matter, and quality of the turf.

RESULT:

Evaluation of the turf was made after two months. Turf quality was noted to be significantly better with the two applications of *actosol* vs. no actosol. Root development both in quantity and length showed significantly better in the actosol treatment. No visible green growth (turf) was present in the control. Based on these observations, *actosol* improved turf quality, reduced compactness, and improved stress tolerance which is a function of root development.

Soil analysis indicated there was a increase of organic matter and also better retention of nutrients. This would also explain that *actosol* increases chelating ability of nutrients held in the soil thus improves stress tolerance and root development. Lastly, it was noted that the *actosol* reduced sodium levels in the soil.

Control **actosol®**

actosol® **Control**

SOIL ANALYSIS FOR VIRGINIA BEACH, FL

	4/28/2008	7/3/2008	
	Wo/actosol	**w/actosol**	**wo/actosol**
ORGANIC MATTER	4.4	5.4	4.3
Phosphorous	280 ppm	265 ppm	225 ppm
Potassium	252 ppm	240 ppm	190 ppm
Magnesium	150 ppm	135 ppm	86 ppm
Calcium	1120 ppm	1050 ppm	975 ppm
CEC	9	14	4
FE	207 ppm	252 ppm	180 ppm
MN	17 ppm	26 ppm	12 ppm
pH	5.9	6.0	5.8

actosol ®

FIELD TRIALS
Report #9

"Calcium *actosol*® improved cation exchange capacity, organic matter and root development on sports turf at Fort Myers Sports Complex, Florida"

Jim Stamp, JSM Services, April, 2008.

In the spring of 2008, a test was conducted to evaluate the use of ***calcium actosol*®** applied with a boom sprayer at 3 gallons of actosol/60 gallons of water per acre on several sports fields located in Fort Myers, Fl. The objective was to demonstrate that calcium actosol could improve Bermuda grass turf performance on highly compacted soils by providing improved root development, thus increase drought tolerance and increase fertilizer efficiency. Second treatment was applied after twenty-four days.

Two Sports Field were treated with 15-5-15 at 1 lb. N/month The first sports field was completely treated, and the second field with a selected area was treated on the warming track. The third field was in a parking area that has very highly compacted soil. Another location Estero Park was chosen with three areas which included an Amphitheater, Soccer Field (treated whole field) and a less maintained soccer field All of these areas are treated with 1 lb. N every 2 months (amp theater) and the soccer fields every month with 15-5-15.

INITIAL OBSERVATIONS:
General observations on this Estero Park area showed turf that had poor root development and moderately acceptable turf quality on the soccer fields. The Amp theatre had slightly better root development and turf quality.

RESULT:

SPORTS COMPLEX

This study showed that actosol® improves root development by increasing more roots and deeper roots on both cool and warm grasses. In relationship to more roots we also noted a direct correlation of improved root development resulting in better turf quality. Based on the soil analysis we also noted that there was a reduction of compactness based on the deep we could achieve via the use of our soil profiler. We noted an increase on the average of 3-4 inches of soil retained compared to no actosol® treatments. The study also confirmed that the actosol® treatment more than doubled the number of active roots per sample compared to the non treated turf.

In reference to nutrient efficiency the study showed the use of actosol® (biostimulant) increased not only the organic matter content (which helps reduce water need to the turf) but also increased the CEC resulting in better retention of most nutrients into the soil. In summary, two applications of 3 gallons of actosol/60 gallons of water increased root development, provided better drought tolerant turf, increased nutrient efficiency, and provided acceptable turf quality.

ESTERO PARK

The study which was conducted at this complex demonstrated that a similar program using actosol can improve turf quality along with improved root development, increased stress tolerance, and greater efficiency of nutrients. Our data also supports that due to the increase of better use of nutrients there is potential opportunities to reduce synthetic fertilizer applications in conjunction with actosol®.

SOIL ANALYSIS FOR FORT MYERS ESTERO PARK FIELDS

	4/10/2008	**6/11/2008**	
	Wo/actosol	**w/actosol**	**wo/actosol**
ORGANIC MATTER	1.3	1.8	1.3
Phosphorous	33 ppm	72 ppm	57 ppm
Potassium	40ppm	89ppm	50ppm
Magnesium	75ppm	100ppm	62ppm
Calcium	650ppm	790ppm	640 ppm
CEC	4.2	8.1	3.9
FE	137 ppm	230 ppm	175ppm
MN	96 ppm	126 ppm	99 ppm
ZN	2ppm	13ppm	3ppm
pH	7.6	7.6	7.4
SS	66	224	114

SOIL ANALYSIS FOR FORT MYERS FIELDS

	4/10/2008	**6/11/2008**	
	Wo/actosol	**w/actosol**	**wo/actosol**
ORGANIC MATTER	2.2	3.9	2.3
Phosphorous	60 ppm	87 ppm	64 ppm
Potassium	74ppm	83ppm	58ppm
Magnesium	140ppm	230ppm	155ppm
Calcium	1200ppm	1600ppm	1190 ppm
CEC	6.6	15.3	7.6
FE	70 ppm	112 ppm	99ppm
MN	75 ppm	214 ppm	129 ppm
ZN	6ppm	39ppm	19ppm
pH	7.6	7.6	7.4
SS	66	224	114

Control **actosol®**

actosol ®

FIELD TRIALS
Report #8

"Bioactivated Base *actosol*® Improved Plant Quality, Enhanced Root Development on Variety of Ornamentals and Reduced the Production Time of Marketability of Container Ornamentals at Michael Nursery, FL"

Mark Battaglini, Production Manager, December, 2007

In the winter of 2007, a study was conducted to evaluate the use of *actosol* on established greenhouse crops. All crops were fertilized and grown under the same similar growing conditions. The following crops were tested: Dracena Lime (6"), Agalomena Silver Queen (6"), and Geranium (14") The rate of actosol® was 8oz/6" container and 32oz/14". All plants received 16-8-8 (100 days fertilizer).

TREATMENTS:

The following treatments were evaluated on growth and performance when using soil drenched with *Base actosol*. Two applications were made during the course of this study.

1. .5 gallons actosol / 400 gallons(1:80 ratio) **2.** 2.5 gallons actosol/ 100 gallons(1:40 ratio)
3. 3 gallons actosol/ 90 gallons (1:30 ratio) **4.** Grower Standard

RESULTS:

Results from our study were evaluated after two months and noted the following responses:

Agalonema Only slight difference in root mass occurred after the first application. Rates of actosol at 1:40 and 1:30 showed significantly better foliage growth compared to (1:80) after 2 soil drenches. actosol vs. non actosol showed that the lower dilution rates (1:30) showed significantly better differences in foliage growth compared to the non actosol treatments.

Dracena; Results on Dracena treated plants showed that 1:30 concentration provided the best overall foliage crop and quality (photo 1) Comparisons of no actosol vs. the 1:80 showed no significant difference.

Geranium; The 1:30 (3 gallons of actosol/90 gallons of water) rate showed the best results followed by the 1:40 (2.5gallons of actosol/100 gallons). Comparisons of actosol vs. non actosol® treatment grower standard showed only a moderate improvement.

DRACENA LIME 6″ CONTAINER

Grower standard **actosol Treatment #3**

actosol ®

FIELD TRIALS
Report #7

"Bioactivated Base *actosol*® Improved Root Development and Plant Quality on Container Grown Ornamentals and Reduced the Production Line at the Nurserymen Exchange, Boynton, Beach, FL"

Steve Iverson, October, 2007

In fall of 2007, a study was initiated on newly planted ornamentals growing in 3 gallon containers. All plants were fertilized with 16-4-9(incorporated).The following crops included Jasmine, Snow on Mountain, and Duranta. Applications of *Base actosol*® were applied twice approximately 4 weeks apart. Each container received 32 oz/ container. The following rated of actosol® were as follows:

Treatments:

1. 1 gallon actosol® /40 gallon water (1:40 ratio), **2**. 2 gallon actosol®/ 40 gallon water (1:20 ratio)
3. 3 gallons actosol® / 90 gallons of water (1:30 ratio), **4**. Grower Standard

RESULT:

Use of *actosol*® on 3 gallon Jasmine (1:20-1:30) were significantly better than the 1:40 or the grower standard. All rates of *actosol*® showed better over all root growth than the grower standard. Root development also showed improvement over control especially 1:20 gallon rate. Results with Snow on Mountain also exhibited better foliage and root development compared to the grower standard. Result on Durata showed no significant different when treated with *actosol*® vs. the grower standard.

	Foliage Growth		Root Development	
Treatment	Jasmine	Snow/Mt	Jasmine	Snow Mt
1. gallon (1:40)	8	7	10	6
2. gallon (1:20)	10	9	10	9
3. gallon (1:30)	9	8	8	7
Control	3	6	6	5

Grower Standard actosol Treatment #3

Grower Standard actosol Treatment# actosol Treatmnt #3

Grower Standard actosol treatment #3

actosol®

FIELD TRIALS
Report #6

"Base *actosol*® Improved Roots and Foliage Growth on Variety of Ornamentals & Reduced the Production Time for Marketability of Container Ornamentals at Country Joe's Nursery, at Boynton, Beach, FL"

David Englert, October, 2007

In the fall of 2007, a study was conducted to determine the effect of soil application of B*ase actosol*® on plant performance and root development on container grown ornamentals. The three genera selected were Spath, Montera, and Mandevilla. All plants were established and growing in 3 gallon containers. All plants received the same fertilizer applications of Florikan 16-6-12.

TREATMENTS:

1. 1 gallon actosol® /40 gallons water (1:40 ratio), **2.** 2 gallons actosol®/ 40 gallons water (1:20 ratio)
3. 3 gallons actosol® / 90 gallons water (1:30 ratio) **4.** Grower Standard (No actosol®)

After four weeks, a second soil drench was applied with actosol®.

OBSERVATIONS:

Results from this study showed that use of *Base actosol*® improved plant quality (more compactness and larger total foliage growth) compared to non actosol® treated plants. Rates of 1:20 and 1:30 showed superior performance of top growth compared to the 1:40 dilution and the grower standard (Photo 1 and 2). Observation of root development showed significantly more roots with *actosol*® compared to non actosol® treatments. We also observed that disease suppression was improved with *actosol*® treatments at the 3 gallon rate.

A second test was initiated in the winter of 2007 to determine the effect of soil drenching of *Base actosol*® on plant performance on liners of newly planted begonia. The fertilizer and growing conditions were similar to test 1

Treatments composed of:

1. 4 oz/ 2 gallon (1:30 ratio) **2.** 4oz/4 gallon (1:60 ratio)

RESULTS: Observation was made after one month

Begonia treated with 1:30 or 1:60 showed improved top growth and more flowers compared to the non actosol® treatments. **(Begonia)** **(Montera)**

control **actosol®**

Grower Standard **actosol® 3 gal. /90 gal.water**

actosol ®

FIELD TRIALS
Report #5

"Effects of *Base actosol*® on Root Development and Turf Growth on a Central Sod Farm in Maryland"

Bill Warpinski, (Owner), September, 2007

A test was conducted to evaluate the use of ***Base actosol*®** on newly seeded tall fescue in the summer of 2007. The objective was to compare the following treatments to evaluate early germination sod stand, and root performance.

1. Base *actosol*® at 2.5 gallon/acre. Dilution 1:20 plus grower standard pre plant fertilizer
2. Base *actosol*® at 2.5 gallon/acre. Dilution 1:20 plus 80% of growers standard pre plant fertilizer program
3. Grower standard program (control). No *actosol*®. Pre plant fertilizer

GROWER PROGRAM STANDARD INPUTS:

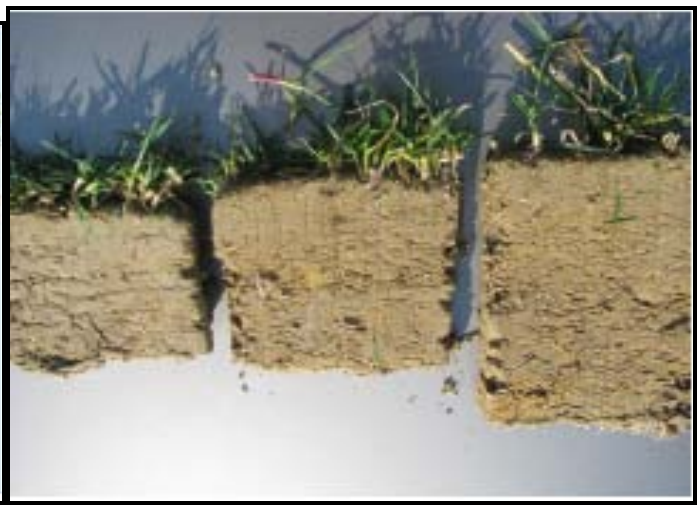
The grower pre plant fertilizer is 14-10-24 plus sulfur and magnesium. Rate is 62 lbs/acre of nitrogen, 44 lbs/acre of phosphorus, 106 lbs/acre potash. Seed rate 250 lbs/acre.

The grower applied a fall application of 27-11-15 at 200lbs/acre the week of Nov 13th. A spring treatment of 27-11-15 was applied in early March.

RESULTS:

The results from our study showed that the use of *actosol*® improved overall root development compared to the controlled. There was a notable difference in sod stand when *actosol*® was applied compared to the control. Visual observations showed a reduction in fertilizer also improved performance in combination with the 2.5 gallons of actosol®/acre treatment compared to the non treated actosol® plot. In reference to top growth the actosol® with 20% less fertilizer and actosol® plus fertilizer (full rate) provided better overall performance.

Final observations were made in the last week of April and similar results were observed compared to the non actosol® treatment.



actosol® 2.5 gal/acre >20% Fertilizer | Grower Standard | Grower Standard | *actosol*® 2.5 gal +full fertilizer rate | *actosol*® 2.5gal/ acre +>20%fertilizer

actosol ®

FIELD TRIALS
Report # 4

"Effect of *actosol*® with Lower Rates of Fertilizer on Fescue Turf on a Southern Belle Sod Farm, Zuni, Virginia"

Steve Cullock, August, 2007

In summer of 2007, a test was conducted to evaluate the use of ***Base actosol®*** on established seeded tall fescue. The objective is to compare the following treatments. And to evaluate sod stand, and root development at the end of the test.

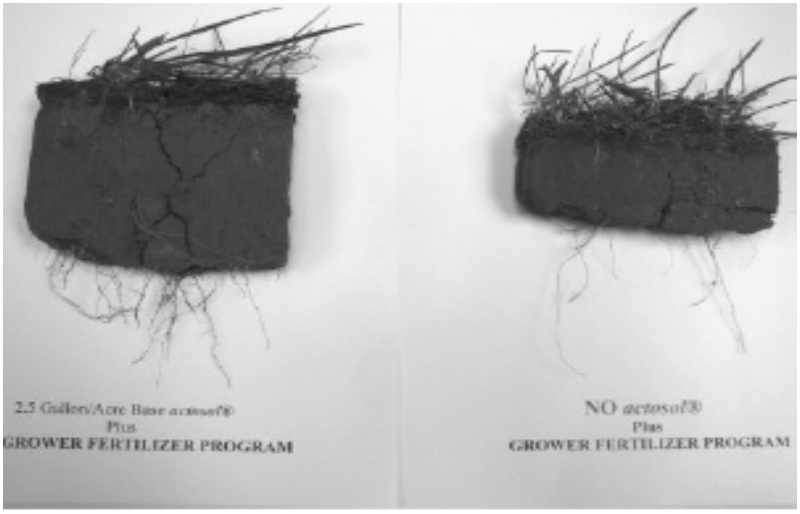
1. Base *actosol*® at 2.5 gallon/acre, Dilution 1:10 plus grower standard urea 18-18-0 fertilizer
2. Base *actosol*® at 2.5 gallon/acre. Dilution 1:10 plus 80% of growers standard 18-18-0
3. Grower standard program. No *actosol*®. 19-18-0 grower standard

The second application was made after one month.

RESULT:

Four weeks after the second application soil profiles were taken from all three treatments. The results to date after 2 treatments showed the following:

Treatment 2 which was Base actosol® at 2.5 gallons/acre and a reduction of 20% fertilizer application showed the best results. Both the depth of roots and the root mass was significantly better than the present grower standard of 18-18-0. It was noted that the roots contained secondary feeder roots and that there were more total active roots. From the application of two treatments it does appear that roots are able to move more efficiently through the soil zones and are not obstructive. **Treatment 1** showed the second best results and also provided an increase in root mass.



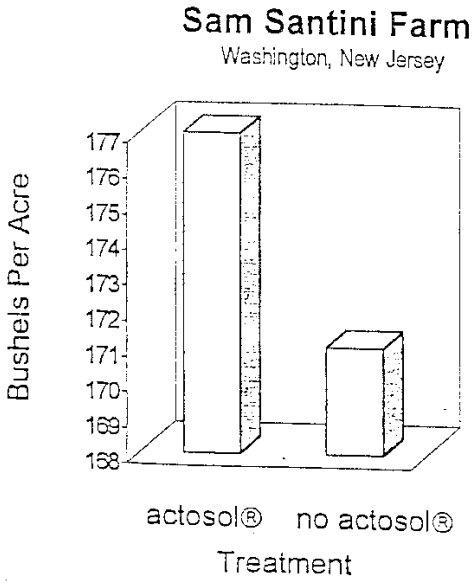
actosol® **Control**

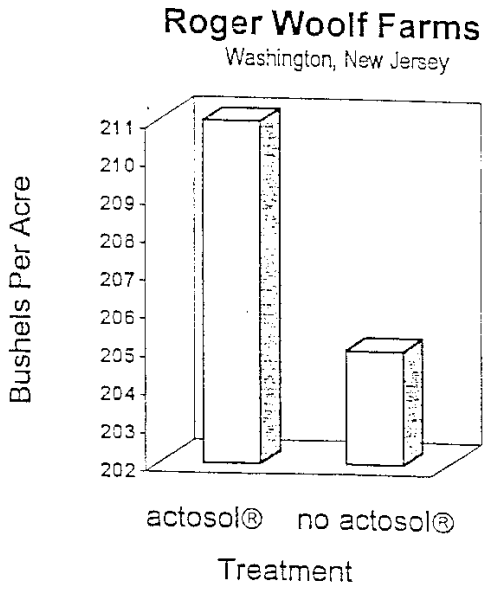
actosol ®

FIELD TRIALS
Report # 3

"The Effects of Humic Acid Containing Nitrogen, Phosphorous and Potash Derived from Recycled Nitrocellulose on Plant Growth". October 2000

Field Tests with actosol® derived from nitrocellulose (NC) fines recycling showed that humic acid containing nitrogen, phosphorus, and potash could be statistically significant in enhancing crop growth. Using ARCTECH's unique ACTODEMIL™ technology, NC fines from a large manufacturing company were recycled to yield an end fertilizer product with a nutrient composition of 5-5-15 (N:P:K). This product was tested on the growth of corn at two separate farms in Washington, New Jersey each comprising a control and test plot of 10 acres. One field plot of 10 acres received treatment while the control plot of 10 acres did not. The actosl® product was applied two times at 1 gal/acre. Initial applications were at planting and mixed in a 30% nitrogen carrier containing Bicep II Magnum and Prowl. Secondary applications were at post-emergence mixed with water. At harvest the plot with the actosol® application yielded an increase of 6 bushels/acre. Similarly, at the second farm the control plot received no application of the actosol® product while the test plot received treatment of 1 gal/acre two times. The initial application was at planting where it was applied with 10-25-5 fertilizer product and banded 2' to the side of the row. At post emergence it was again applied at 1 gal/acre. At harvest the result revealed an increase in yield of 6 bushels/acre in the actosol® test plot when compared to the control.





actosol ®

FIELD TRIAL
Report #2

"The Effects of Professional actosol® on Soybean Growth"
Beaufort, North Carolina, October 1998.

Increasing Yields:

Open Grounds Farm, a 44,000 acre farm located in Beaufort, North Carolina, applied Professional actosol® to several of its soybean fields in spring 1998. The objective of the trial was to determine the capability of actosol® to increase overall yield. Six areas of similar soil composition and topography were designated as test plots. All fields were managed identically throughout the growing season, with the only difference being the application of actosol® to the designated test plots.

A total of 275 gallons of Professional actosol® was applied to the soybean test plots at rates of one, two and three gallons per acre. Soybeans were harvested during the second week of November 1998 with a resulting increase in yields in the actosol® treated plots over the non-treated plots. Highest increases in yields were reported in test plots where Professional actosol® was applied at the rate of three gallons/acre. Soybean yields in plots treated at the rate of three gallons/acre increased a minimum of 15% and a maximum of 44%.

Reduction of Phytotoxicity:

Professional actosol® was applied as a 550 mg L-1 humate concentration (1.1 lbs./acre Al) in a foliar application with a post-emergence application of Blazer (aciflourfen) herbicide, surfactant and manganese. The soybeans were in the fourth trifoliate. The stunting effects and phytotoxic effects of Blazer on soybeans are well published. This effect is exhibited by spotting of the leaves and is usually outgrown within 20 days under normal conditions. However, Blazer is a popular product due to its low cost and broad spectrum of weeds that it controls.

Fourteen days after treatment, test plots treated with actosol® and Blazer had progressed to the eighth trifoliate while soybeans treated with Blazer alone were just beginning their fifth trifoliate. The addition of actosol® to the Blazer significantly reduced phytoxicity and enhanced growth resulting in an increase of 6.8 bushels per/acre at harvest. At 1997 market prices, the grower's initial investment of $24.00 per acre resulted in a net return of $21.90 per acre (91%) based on the 6.8 bushel increase at a market price of $6.75 per bushel. The effects of actosol® were further magnified when consideration was given to the 4.5 inches of rainfall received, which was less than half of the average for the region.

actosol ®

FIELD TRIAL
Report #1

"The potential for actosol® Humic Acid Soil Amendment to Reduce Phosphorous Application Rates and Foliage Burn."

Paul Bodenstein, Crop Agronomist, October 1998.

Cereal crops planted in the Mid-Atlantic region are planted in the fall when soil temperatures and soil microbial activity are in decline. These decreases result in less available phosphorous in the soil requiring the addition of phosphorous to ensure availability for adequate plant growth. actosol® humic acid products stimulate soil micro-organisms and enhance P solubility. Adding actosol® to small rates of nitrogen should allow growers to reduce or eliminate P rates in the fall on "high" and "very high" P-testing soils.

In the fall of 1997, Ag. Systems, a Virginia crop consulting firm, applied Professional actosol® with a full rate of fertilizer to barley and at a half-rate to wheat to determine the effect of actosol® in reducing or eliminating excess fertilizer costs. Application rates at the test plots were three gallons per acre.

Two barley test plots received the full fertilizer rate plus Professional actosol® and yield at harvest showed no significant increase. Both plots averaged 102 bushels per acre at harvest in 1998. In a separate trial, Professional actosol® was applied at the rate of one gallon per acre, with the second spring nitrogen application to determine of "foliage burn" would be impacted. Visible results were achieved with "burn" noticeably reduced. Test plots were replicated and yields recorded at harvest. Plots treated with Professional actosol® averaged 101.5 bushels per acre compared to untreated plots which yielded 96.3 bushels per acre. Foliar applications of Professional actosol® increased barley yields by an average of 5.2 bushels per acre.

Two separate wheat plots were also planted and tested. The first test plot was planted at rates of 30 lbs. of nitrogen, 70 lbs. of phosphates, 100 lbs. of potash and three gallons of Professional actosol® per acre. Yield at harvest averaged 67.74 bushels per acre. The second test plot was planted at a rate of 30 lbs. of nitrogen, and a "half-rate" of 35 lbs. of phosphates, and 50 lbs. of potash. The results at harvest indicated an increase in yield over the "full rate" test plot of 2.52 bushels at 70.26 bushels per acre.