

EFFECTS OF TREATMENT OF SEED BED SOIL WITH BIO-CON CRC-400 AGRICULTURAL SOIL INOCULANT ON THE EMERGENCE OF SEEDLINGS UNDER FIELD CONDITIONS

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SUMMARY: A commercial rate of BIO-CON CRC-400 agricultural soil inoculant product was applied over plots containing seeds of three crop types using a drench after planting. In each case, there was a highly significant difference in the rate of emergence and final average dry weights in favor of the BIO-CON product. The number of emerged plants in the control eventually tended to equal the number of emerged plants in the treated row in each case, indicating no real advantage in using this product to achieve higher plant populations per acre where these varieties and soil type are concerned. The treated-row plants were, however, roughly two days ahead of the control-row plants in terms of number emerged at any point during the course of the trial.

METHODS AND MATERIALS: A strip of dry soil long enough to accommodate three 110-inch-long plots end to end was selected in a portion of a field having uniform soil conditions and then was rototilled to a width of three feet so that two rows of seeds could be planted eighteen inches apart down the length of each bed in well-mixed soil of fine tilth.

Seeds of three crop types. Bush green pea 'Green Arrow', an experimental hybrid black-spined pickling cucumber No. 2608, and hybrid sweet corn 'Butter Sweet' were obtained from Keystone Seed Co., of Hollister, California, after they had been treated with fungicidal seed protectants such as Arasan and Captan at commercial rates.

The tilled strip was divided into three 110-inch-long plots, and two uniform seed furrows one inch deep and 100 inches long were made in each plot by firming a piece of 2-inch diameter pipe into the loose soil until the midline of the pipe was at the soil level along its entire length.

A spacing of 18 inches was established between the two parallel seed furrows in each plot to provide a physical barrier of dry soil to prevent lateral migration of the microbes being tested into the control.

With the use of a tap measure, seeds were set into the seed furrows every inch for 100 inches and then covered with screened soil up to the plain of the seed bed, leaving all seeds uniformly covered with one inch of soil, which was gently firmed by patting to prevent settling upon irrigation.

A half gallon volume of solution containing a rate of four 60-gram “units” of BIO-CON CRC-400 was then applied to one row in each bed in a six-inch-wide band through a watering can directly above the seeds. A “unit” is the manufacture’s standard packaging volume around which prices, manufacturing quotas, and recommended rates to apply per acre are made.

An equal amount of water was then applied to each control strip. All plots received an additional half gallon of water immediately thereafter to drive the product down towards the seed and to provide moisture needed for germination;

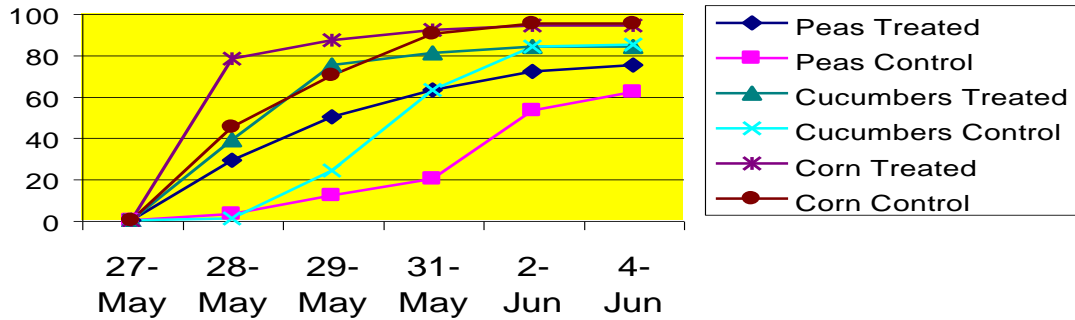
Moderate volumes of irrigation water, usually three gallons at a time, were applied equally as needed at three times during the course of the test in a manner that wetted soil below the seed for root development without allowing lateral capillary movement which could serve as a bridge for migration of the product into the control row.

Emerged plants were counted on six of the nine days during which emergence was occurring with the exception of the Corn, which emerged a day earlier than the other two species and which was therefore counted on seven of the nine days before the test was terminated on June 4, 1981, and the plants harvested at the soil level for a determination of their average dry weights.

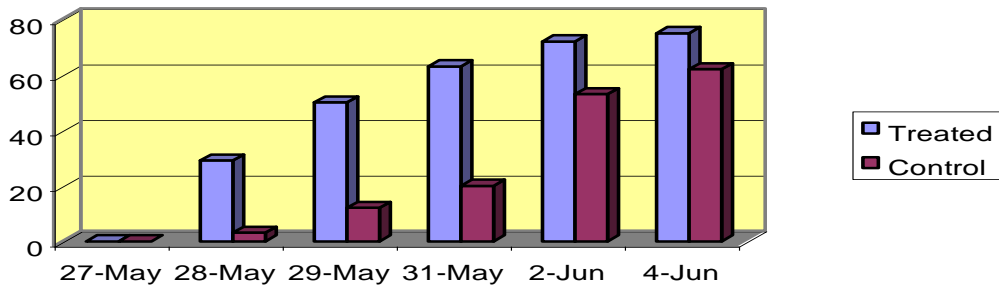
RESULTS: It is apparent from the following tables and graphs that the seeds treated with the BIO-CON emerged at a significantly faster rate than the control in all cases, and were more developed, as measured by their higher average dry weights compared to those of the control.

In each case, the total number of emerged seeds in the control tended to eventually equal the number in the treated row two days after there was no further emergence in the treated rows.

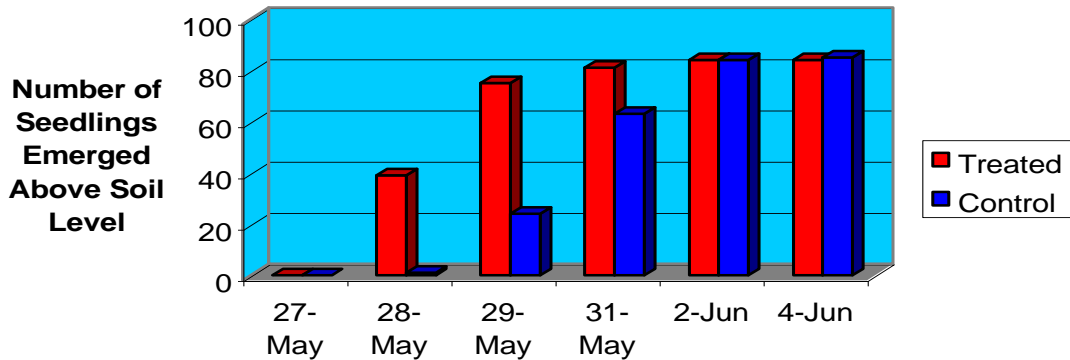
BIO-CON CRC IN THE EMERGENCE OF SEEDLINGS

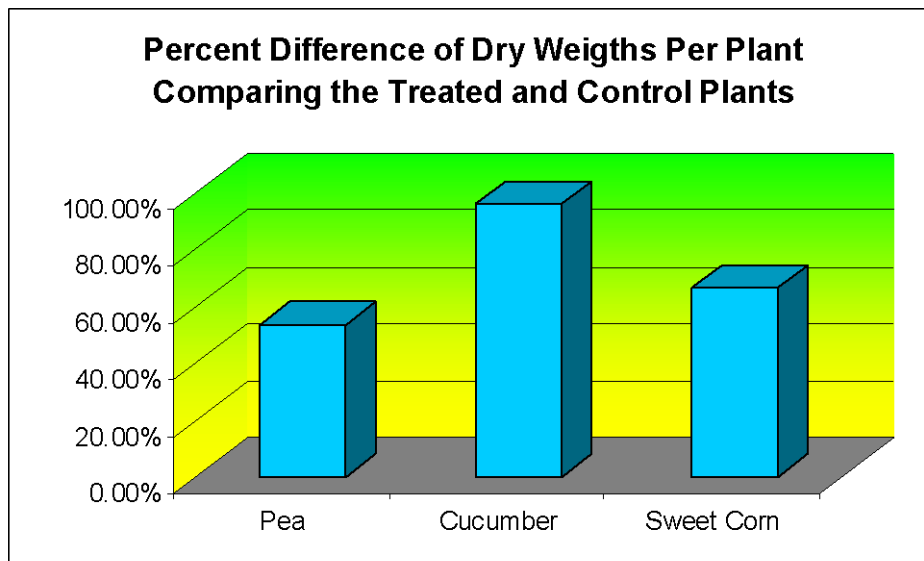
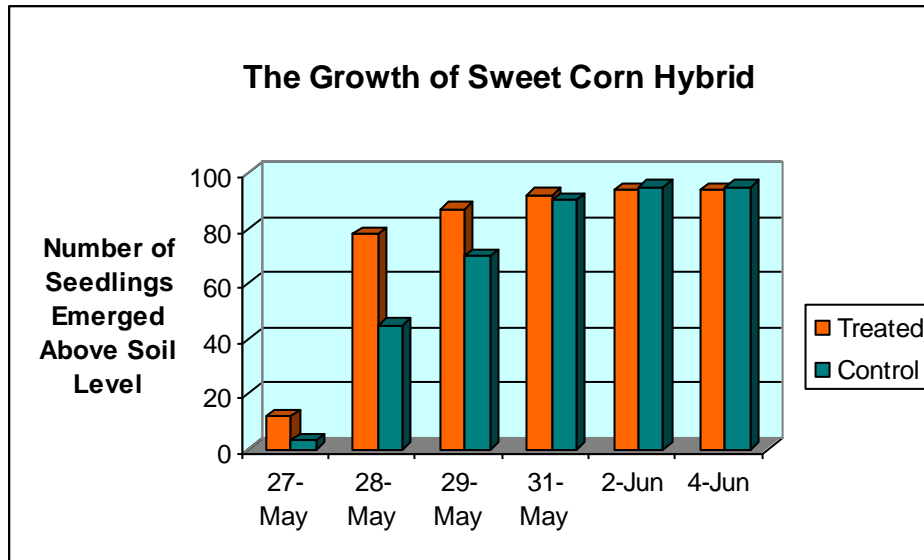


Bush Pea: Number of Seedlings Emerged Above Soil Level



Experimental Hybrid Black-spined Pickling Cucumber





DISCUSSION: It is interesting to note that the presence of fungicidal seed protectants on the seeds did not render the BIO-CON microbes ineffective, despite the fact that several of the eleven species contained in the product are fungal. Whether still-better results are obtainable using seed not treated with the protectant is not known.

A second possible stress on the product during this test resulted when the first day's one gallon of irrigation water or solution per plot proved insufficient in volume and was lost by evaporation from the upper centimeter of soil into which it had penetrated, leaving the microbes above the seeds in air-dry soil until noon the following day, at which time larger

volumes of water were applied and the soil wetted well below the seed and maintained that way.

Apparently, as long as the naked microbes in the product are out of the direct rays of the sun they can tolerate air-dry soil for some time, making the product all the more practical for commercial use by farmers.

The mode of action affecting the germination of seeds and causing them to emerge in less time than the control was not explored in the course of this experiment. Note should be taken that this test was conducted in a light soil of pH 7.3 with very low organic matter and carbonate content, which therefore does not offer much in the way of carbon sources required for optimum activity by microbes.

Whether or not the treated plants would have managed to stay ahead of the control plants in terms of physical development for some weeks or months as the crop matured towards harvest is not known since all plants were harvested early.

CONCLUSION: Treatment of seed bed soil with the band application of BIO-CON CRC-400 agricultural soil inoculant at planting definitely improved the time to emerge and the seedling vigor of these varieties in this soil. Whether or not this effect would result in enough higher yield to pay the cost of this product as used here but on a commercial scale would necessarily depend on the prevailing field conditions and nature of the particular limiting factors holding down yield present at the time.

Some growers might appreciate using this product for its effect on seeds if time to emerge and seedling vigor are a concern in their particular operation for some reason.

CALENDAR TIME LINE OF EVENTS
May 22 – June 4, 1981

- 22-May Peas, Cucumber, and Corn seeds planted and Bio-Con CRC-400 Solution Applied to the treated rows. All irrigated.
- 23-May Applied additional irrigations to all plots, moisture should be at below Seed level now.
- 24-May Applied additional irrigations to drive moisture front below seeds so roots will not be inhibited by dry soil.
- 25-May
- 26-May
- 27-May Corn: TR=12, C=3. Cukes: TR row more cracked and heaved than control, appear to be emerging sooner. Peas: TR cracking.
- 28-May 20:39 Hrs. Peas: TR=29, C=3. Cukes: TR=39, C=1. Corn: TR=78, C=45
Note: Most C Corn plant appear smaller than TR in development
- 29-May 18:06 Hrs. Peas: TR=50, C=12, Cukes: TR=75, C=24, Corn: TR=87, C=70 (emerged but less plant development it seems)
- 30-May No Data
- 31-May 18:00 Hrs. Peas: TR=63, C=20. Cukes: TR=81, C=63 Corn: TR=92, C=90
- 1-Jun No Data
- 2-Jun 17:00 Hrs. Peas: TR=72, C=53. Cukes: TR=84, C=84. Corn: TR=94, C=95
- 3-Jun No Data
- 4-Jun 13:27 Hrs. Peas: TR=75, C=62. Cukes: TR=84, C=85. Corn: TR=94, C=95. All three tests terminated, plants harvested at soil level for determination of average dry weight.