SEP™ 100, A SODIUM AZIDE-BASED BROAD SPECTRUM PESTICIDE

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Abstract

Sodium azide (NaN3), as formulated in SEP™ 100, has proven to be a highly-effective, broad-spectrum pesticide. SEP™ 100 safely and efficiently controls soil-borne weeds, nematodes, fungus and bacteria. Since the early 1900s, sodium azide has been tried in various experimental pesticides**.** In the 1970s, four azide-based formulations were used primarily on peanuts and tobacco. American Pacific Corporation, in conjunction with Auburn University, has developed a new and enhanced formulation that has improved sodium azide's efficacy as a pesticide, making it an attractive alternative to ozone-depleting methyl bromide (MBr).

SEP™ 100 is an inorganic, environmentally-friendly pesticide which has proven to be an excellent alternative for Methyl Bromide. It efficiently controls a wide array of soil-borne pathogens utilizing existing drip irrigation systems with rates of less than 100 lbs ai/a. SEP™ 100 is currently in the registration process with the U.S. EPA. It is being applied in several on food and non-food crops trials. American Pacific Corporation plans to expand these trials outside of the U.S.

Key Words: SEP™ 100, sodium azide, nematacide, herbicide, fungicide, bacteriacide, Methyl Bromide alternative

For well over a century, sodium azide (NaN3) has had many uses. The more prominent and well-known applications have been as an intermediate to manufacture a number of pharmaceuticals, including AZT, and as part of the gas generating systems used to inflate automobile airbags. At one time, pure sodium azide was used as a medication to control hypertension. Patients eventually developed tolerances, thus it became less effective and no longer useful for this explicit purpose. We have found no reports of long term adverse health effects from the consumption of low doses of sodium azide for medicinal purposes.

The first recorded use of sodium azide being as a pesticide dates back to the 1920s. It was applied as a solid and used to control soil-borne insects. In the mid 1970s, four solid azide (N3) pesticides were registered and used for a short time. They depended on rain to transfer the active ingredient into the soil. At the same time the evolving automobile airbag

market caused an unanticipated demand and significant upward price shift for sodium azide to a point where it was no longer economical to be used as a pesticide.

In 2001, American Pacific Corporation and Auburn University established a cooperative agreement to continue the research, development and use of sodium azide-based pesticides. The end result of several experimental formulations is a formulation called SEP™ 100. SEP™ 100 was specifically designed to be a safe, efficient, economical, soil-enhancing product, therefore the name "SEP". SEP™ 100 is a novel, pre-plant pesticide applied using typical drip application equipment. The SEP™ 100 formulation is a combination of a single active ingredient along with a proprietary blend of inert ingredients. A stenching agent and a dye are added for safety and handling considerations. SEP™ 100 is a zero ozone-depleting compound.

SEP ™ 100 and/or a close variation have been tried in several locations on food and non-food crops. The results clearly show that when properly applied, one can expect excellent control of a broad spectrum of soil-borne pathogens including weeds, nematodes, bacteria, and fungi. The active ingredient is applied in relatively low amounts between 40 and 100 lbs ai/a. The objective is to reach a concentration of 20-40 ppm in the bed according to the target pathogens, e.g. fungus at 20 ppm and weeds at 40 ppm. Environmental factors within the soil, such as temperature, moisture, and pH will influence the persistence of the active ingredient. Studies have shown that the active ingredient has at times fully dissipated within six days.

American Pacific Corporation applied for U.S. EPA registration of SEP ™ 100 in April 2004. The signal word is "**WARNING.**" The 2004 application is for pre-plant, non-food use only. We intend to expand the registration for use on additional crops as well as develop additional sodium azide-based pesticide formulations. We are also preparing for non-U.S. trials and registration campaigns.

Example of a Tomato Trial

- Fall 2003, Tomato Trial in Bradenton, Florida, GCREC

- SEP™ 100 was applied September 24 and 25, 2003, and planted on October 15, 2004

- Trial included two applications of SEP™ 100, Untreated Control (UTC), one application of MBr and 14 other proposed MBr alternatives

- SEP™ 100 was applied at two rates, 75 and 150 lb ai/a. (SEP 100-75 and SEP 100-100)

- Each application was followed with a water only rinse four days after initial application followed by a second water only rinse seven prior to planting

- Planting was accomplished 17 days after initial application

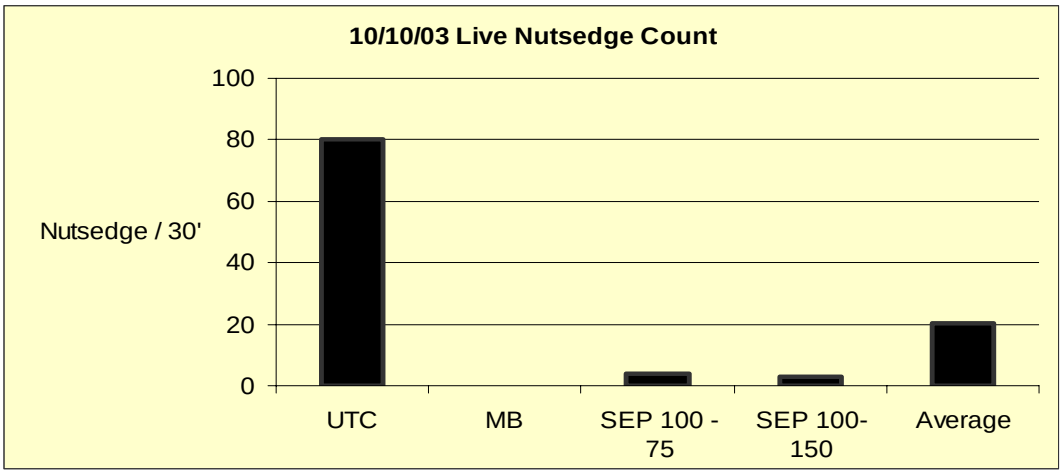
- Crop: Tomato cv. Florida 91

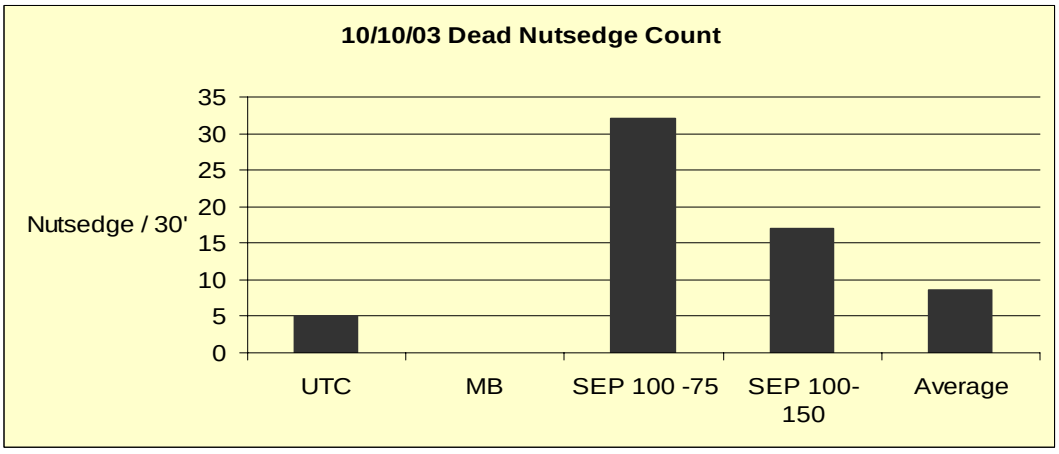
- SEP ™ 100 was applied in a RCM arrangement and repeated six times along with:

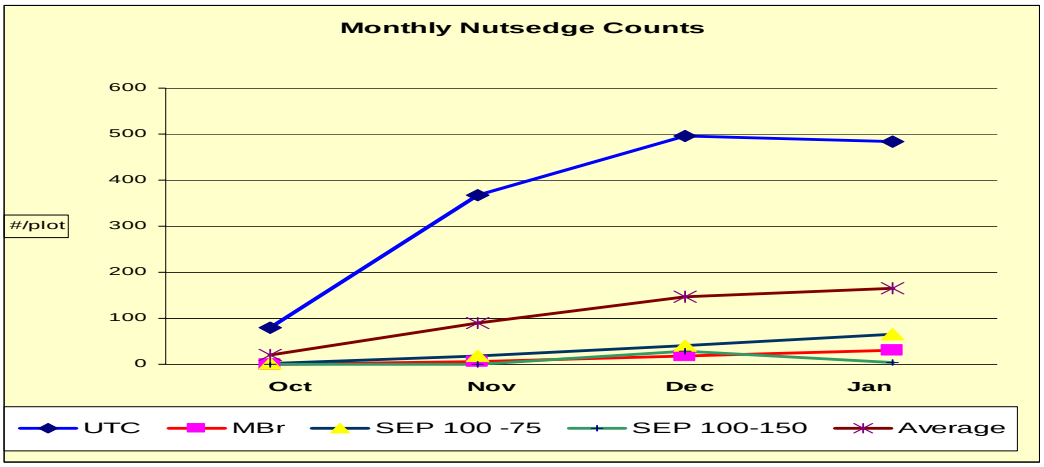
    - 15 other competitive MBr alternatives

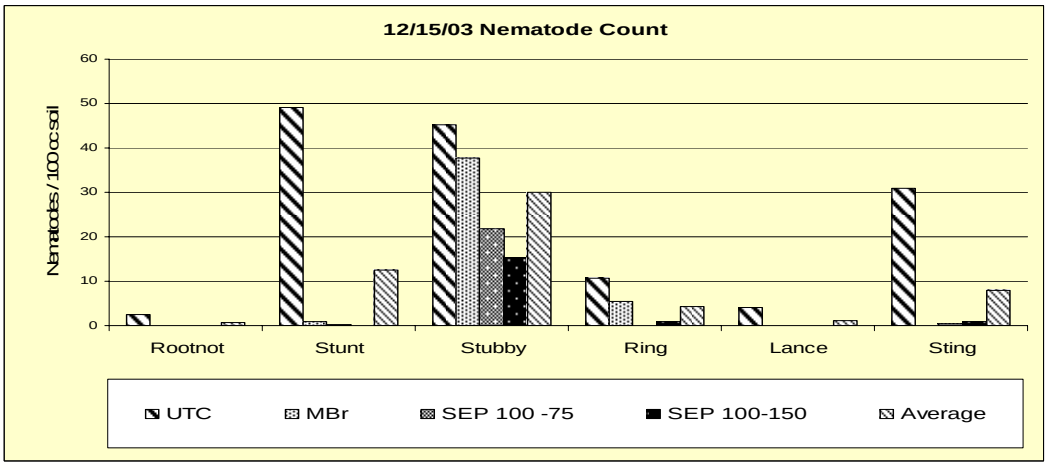
    - MBr 67/33 was applied at a rate of 350 lbs/acre

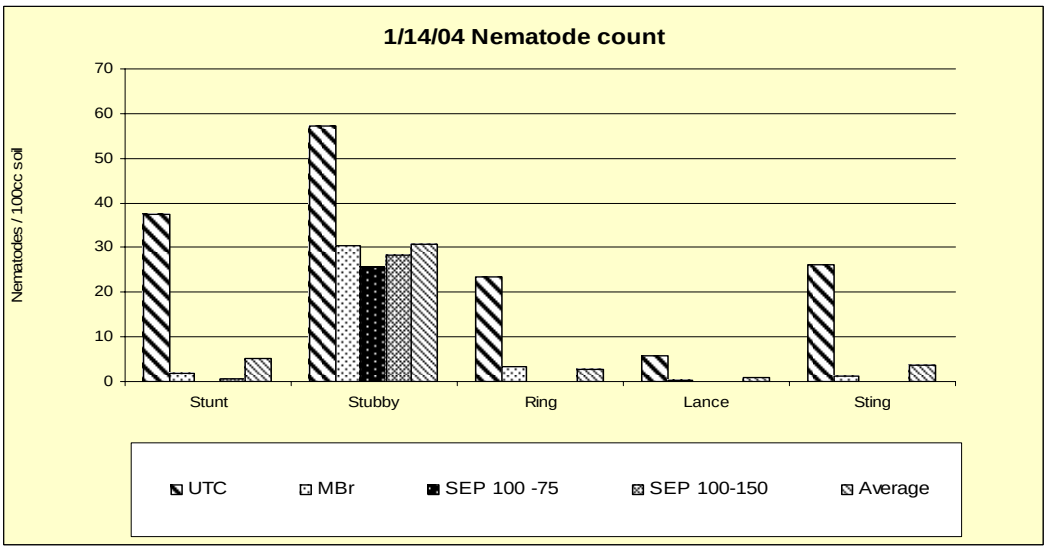
    - Untreated Control (UTC)

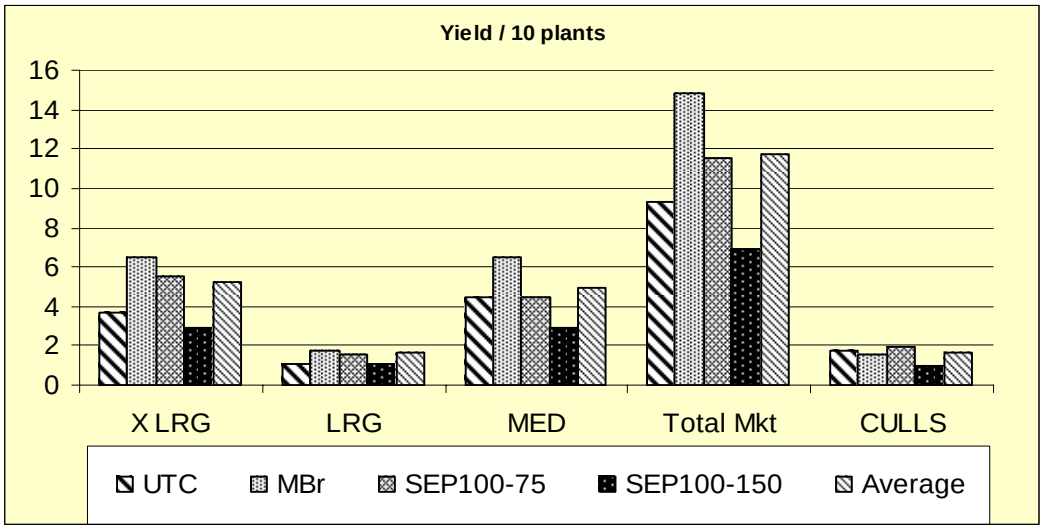





Monthly Nutsedge Counts
600
500
400
300
200
100
0
#/plot
Oct
Nov
Dec
Jan
UTC
MBr
SEP 100 -75
SEP 100-150
Average


12/15/03 Nematode Count
Nematodes / 100cc soil
60
50
40
30
20
10
0
Rootnot
Stunt
Stubby
Ring
Lance
Sting
UTC
MBr
SEP 100 -75
SEP 100-150
Average


1/14/04 Nematode count
Nematodes / 100cc soil
70
60
50
40
30
20
10
0
Stunt
Stubby
Ring
Lance
Sting
UTC
MBr
SEP 100 -75
SEP 100-150
Average



Conclusion

American Pacific's SEP™ 100 formulation has proven to be a highly-effective and safe pesticide. SEP™ 100 is a broad-spectrum pesticide which will control nematodes, weeds, fungus, and bacteria. SEP™ 100 is short lived within the soil is and is not a soil sterilant. SEP ™ 100 is an excellent replacement for MBr and other hazardous pesticides. The application of SEP ™ 100 is a simple two or three step process involving the initial application using existing drip apparatuses followed by a rinse of water only. SEP™ 100 is currently in the U.S. EPA registration process.

For additional information, please go to www.apfc.com