

Research Proposal for 1995

Submitted to:

SLV Research Center Committee
and the
Colorado Potato Administrative Committee (Area II)

TITLE: Potential Volatility Losses of EPTAM During Sprinkler Application and the Influence of Soil Moisture Levels at Time of Application on EPTAM Efficacy

PROJECT LEADERS: Drs. Scott Nissen and Mark VanGessel, Department of Plant Pathology and Weed Science, Colorado State University, Fort Collins (Phone 303-491-3489, FAX 303-491-0564) in cooperation with Mr. Randal Ristau, SLV Water Quality Demonstration Project, Cooperative Extension, Colorado State University, Monte Vista, CO.

PROJECT JUSTIFICATION: Eliminating weed competition is an essential part of profitable potato production in the San Luis Valley. One component of many weed management programs is the use of EPTAM applied preplant or postemergence through overhead sprinklers for the control of annual grasses and nightshade. EPTAM controls weeds as they germinate because it is absorbed by emerging shoots as a vapor. EPTAM's presence in the soil as a vapor is essential for herbicidal activity but this characteristic also makes EPTAM susceptible to significant volatility losses during the application process. Research conducted at Washington State University suggests that temperature, relative humidity and wind speed at time of application can have a significant impact on EPTAM losses. Characteristics of the sprinkler system such as distance from the sprinkler heads to the soil, size of droplets produced, and the uniformity of application can also have significant impacts on losses due to volatility and subsequent efficacy. Additional research has shown that applying EPTAM to wet soils can result in reduced efficacy because the herbicide is lost due to a process called codistillation.

EPTAM is widely used in the San Luis Valley and it represents the most effective chemical control strategy for nightshade. Since nightshade has a long period of emergence it is important to understand how to use EPTAM to maximize the period of effective weed control by minimizing volatility losses to the environment. Information developed in other regions of the country is not readily applicable to the San Luis Valley because the environment is so unique. The results of our proposed research may show that the cool air and soil temperatures at the time of EPTAM application minimizes volatility and maximizes the effective period of weed control. On the other hand, this research might suggest that producers are not receiving maximum benefits from EPTAM applied through sprinkler systems because of volatility losses or losses due to codistillation when soils are wet at the time of application. Newer sprinkler systems (spray heads on drops) may significantly reduce EPTAM losses due to volatility by reducing the distance to the soil surface and by using lower pressures to increase droplet size. Results from this research project should be very useful to the potato industry in the San Luis Valley because they will 1) help to determine the efficiency of "chemigating" EPTAM, 2) indicate what management strategies could be used to reduce EPTAM losses, and 3) demonstrate that growers in the San Luis Valley are striving to understand and improve their pest management techniques.

PROJECT STATUS: New project.

OBJECTIVES FOR 1995: The proposed research is designed to 1) evaluate the potential losses of EPTAM during application by standard overhead sprinkler systems and sprinklers with spray heads on drops 2) determine the influence of soil moisture at time of application on volatility and 3) evaluate the influence of vapor loss and soil moisture levels on the effective period of weed control.

These objectives will be accomplished using the following methods:

- Samples of irrigation water will be taken near the sprinkler heads and soil surface at four distances from the well head, comparisons will be made between standard sprinkler systems and systems with spray heads on drops.
- EPTAM will be extracted from the water samples using solid phase extraction at the SLV Research Center and transported to CSU for analysis by gas chromatography/mass spectroscopy.
- Replicated field plots will be established to compare treated with untreated plots at two moisture levels (untreated plots will be covered with tarps at time of application)
- Moisture levels in subplots will be established using hand lines.
- Soil sample will be taken (to depth of 10 cm) immediately after application and than at 2 and 4 hours after EPTAM is applied.
- Winter wheat will be planted into the plots as an indicator species at 2 week intervals (4 times) to determine the effective period of weed control and additional soil sample will be taken to determine EPTAM residues in the soil.
- Plots will be rated for overall weed control, winter wheat biomass will be determined and compared to untreated controls and plots will be harvested for yield.
- Experiment will be conducted in 1995 and 1996.

FUNDING REQUEST:

Item	Cost 1995	Cost 1996
Field Research Project		
-Travel=2-3 people/4 roundtrips (mileage, lodging, meals)	\$2732	\$2732
-Salaries (Research Associate+Student Hourly)	\$1200	\$1200
-Miscellaneous Supplies	\$ 500	\$ 500
Subtotal	\$4432	\$4432
Laboratory Analyses		
-Salaries (Lab Supervisor+Student Hourly)	\$2200	\$2200
-Supplies to Process Samples	\$1200	\$1200
-GC/MS analyses (GC Column, Pure Gases, miscellaneous supplies and service)	\$1500	\$1300
Subtotal	\$4900	\$4700
Grand Total	\$9332	\$9132

Cooperative Agreement with SLV Water Quality Demonstration Project:

The main function of the SLV Demonstration Project staff will be to act as a liaison between the cooperator and CSU personnel in Fort Collins. Mr. Randal Ristau has agreed to assist in identifying off station cooperators, coordinating operations between the cooperator and CSU personnel, maintaining accurate records of general farming practices (primarily irrigation scheduling) and assisting in all phases of the field research project.

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