United States Department of Agriculture

NRCS Natural Resources Conservation Service

Pest Management (595) – Biofumigants

Conservation Practice Job Sheet **ID- 595, JS- 12**

Natural Resources Conservation Service - Idaho **October 2007**

What is Pest Management?

Pest management is defined as "utilizing environmentally sensitive prevention, avoidance, monitoring, and suppression strategies, to manage weeds, insects, diseases, animals and other organisms that directly or indirectly cause damage or annoyance." Effective pest management relies on the use of many tools or strategies to reduce the impacts of pests on crops in order to meet landowner objectives.

Purpose

Pest management is applied as part of a resource management system to support one or more of the following purposes:

- Enhance quantity and quality of crops grown for food and fiber.
- Minimize negative impacts of pest control on soil resources, water resources, air resources, plant resources, animal resources, and/or humans.

Integrated Pest Management - IPM

This practice provides an opportunity for the producer to learn about the complexities of pest management and how to effectively incorporate IPM principles into their overall management. The ultimate goal is to develop a management strategy that will integrate all aspects of pest management within the agricultural production system – this is called Integrated Pest Management, or IPM.

Biofumigants as an IPM Tool

Green manure cover crops, such as oilseed radish and mustard, have been successfully used in crop rotations prior to sugarbeets, potatoes, onions, beans, and other row crops. Green manure crops can improve soil quality, fertility and water infiltration, and suppress soil-borne pests and diseases. Reductions in the numbers of nematodes, disease problems, and weeds are thought to be due in part to the presence of glucosinolates in green manure crops. When the crop is incorporated into the soil, the breakdown of glucosinolates produces other chemicals that act against pests. These chemicals are similar to the active chemical (methyl-isothiocyanate) produced by soil application of a synthetic fumigant, like metam sodium (refer to *Using Green Manures in Potato Cropping Systems, Washington State University Extension Bulletin,* EB1951E).

The use of mustard green manures in potato cropping systems has been successfully demonstrated on the Fort Hall Indian Reservation. In field trials, the potato crop after mustard green manure incorporation performed as well as the standard treatment with methyl-isothiocyanate releasing products. Mustard production costs averaged $120/acre/year over the 2-year trial.

Practice Specifications

This practice applies to cropland with potatoes or sugarbeets. Producers eligible for this practice have an identified water quality or plant condition concern,

and must meet all criteria in the Pest Management (595) Standard. This includes an environmental risk analysis, and implementation of mitigating practices if an Intermediate or greater hazard is identified. Recommended mitigating or companion practices include grassed waterways, filter strips, riparian buffers, irrigation water management, residue management, or other appropriate practices to fully address the water quality concerns.

Green Manure Crops

The use of green manure crops with biofumigant effect is required. Green manure crops are currently limited to oilseed radish or mustard. Certain varieties may be more effective than others. Substitutions of these green manure crops must be approved in advance.

Careful management is needed to realize the full benefits of green manure crops. For potato cropping systems, approximately 15 lbs/acre of mustard seed is planted in mid-August following a grain or bean crop. Planting time is important to achieve optimal green manure crop production. Poor field preparation can hinder germination and growth. Demonstration studies have shown that irrigation, fertilization, and/or weed control are required. After approximately 8-10 weeks of growth, the green manure crop is chopped and disked.

Follow the Washington State University Extension Bulletins, *Using Green Manures in Potato Cropping Systems* (EB1951E) or *Mustard* (EB1952E), both available online at http://grant-adams.wsu.edu or 1-800-723-1763. These publications describe crop characteristics and requirements for use of mustard as a biofumigant. A minimum seeding rate of 15 lbs/acre for mustard and 25 lbs/acre for oilseed radish is required. For additional information on green manure cropping with radish, refer to the University of Idaho Extension publication *Management of Sugarbeet Nematode*, (CIS 1071), available online at http://info.ag.uidaho.edu/Resources/PDFs/CIS1071.pdf or *Management of Oilseed Radish and Yellow Mustard Green Manure Crops* at http://www.uidaho.edu/sugarbeet/nmtds/oilseed.htm.

The attached Biofumigant Record worksheet must be completed. It is a good idea to track green manure production costs on a yearly basis (costs include seed, planting, fertilizer, herbicide, water/power, chopping, etc.), but this is not required. Attach receipts related to green manure crop production (seed purchase, for example).

Pesticide Use and Recordkeeping

The use of any fumigant with this practice must first be preceded by appropriate nematode sampling, as outlined in the University of Idaho publication CIS1056, *Sampling Procedure to Diagnose Nematode Infestations* (http://info.ag.uidaho.edu/pdf/CIS/CIS1056.pdf) or the Pacific Northwest Disease Management Handbook (http://ipmnet.org/plant-disease/index.cfm). It is recommended that producers follow University of Idaho treatment thresholds in their management decisions to control nematodes. The treatment thresholds for potatoes are summarized in the *PGI Best Management Practices, Checklist for Quality Potatoes (2006, 2007)*.

Records are an important tool to track pest populations over time, and can document reduction in pesticide use. All pesticide use must be recorded. Documentation shall include product name or active ingredient, application location (field identification), target pest, application rate, application timing, and extent of application (entire field vs. spot treatment, for example). The producer may use blank copies of the Pesticide Data Collection Sheet to keep annual records, or may use any format for record keeping that provides the required information.

CLIENT'S ACKNOWLEDGEMENT STATEMENT

The Client acknowledges that:

a. Mustard and oilseed radish are approved green manure crops on potatoes and sugarbeets. Any substitutions must be pre-approved.

b. Careful management is needed to realize the full benefits of green manure crops. The producer must keep records of biofumigant crop management activities.

c. The use of fumigants following a green manure crop MUST be preceded by appropriate nematode sampling. The use of University of Idaho treatment thresholds in any management decisions to chemically control nematodes is recommended. All pesticides applied must be recorded.

d. The producer has received a copy of this practice specification and understands the contents and requirements.

Accepted by:/s/_____ Date:_____

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BIOFUMIGANT RECORD

Tract and Field Number or Field Name	Acres	Previous Crop	Planting Date for Green Manure Crop	Seeding Rate	Applied Appropriate Irrigation, Fertilizer, and/or Weed Control?	Date of Soil Incorporation
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	
					YES NO	

PESTICIDE DATA COLLECTION SHEET

Crop	Target Pest	Product Name or Active Ingredient (AI)	% AI	Broadcast or Banded	Application: Surface, Foliar, or Soil Incorporated	Rate Used