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SARE Project LNE93-36

SARE Project ANE93-18

ATTACHMENT #2

Project Number: LNE93-36/ANE93.18

Maine Potato Industry Survey on Soil Management

Results of 1996 University of Maine Cooperative Extension Survey of Maine Potato Industry:

Number Sent: 600 growers, 400 other industry members
Number Returned: 35 grower surveys (35/600 = 5.8% return rate)

Summary of Responses:

- *** Growers gave high scores to recent information provided on the topics of general soil management, use of composts as soil amendments, supplemental irrigation, and general use of rotation crops. A considerable portion of the information provided on the topics of soil amendment use and supplemental irrigation was supported by this SARE/ACE project. Essentially all respondents found that information presented on these topics was of great value. Use of alfalfa rotations, manures as soil amendments, and paper mill sludges as soil amendments received lower scores and 14 to 26% of growers responded that the information on these tools was of little value to them.
- *** Most growers (>80%) indicated that they had changed general soil management practices and crop rotations as a result of recent UM Cooperative Extension programs. In the case of soil management, growers indicated that 5120 acres had been affected (Maine produces approximately 80,000 acres of potatoes annually). In the case of crop rotations the total affected was 2430 acres. Sixty-eight percent of the growers indicated that they planned to change rotation crops and 84% indicated that they plan to increase the length of rotation. The results indicate that growers feel confident that they can improve these practices with the information, technology, and financial resources currently at hand.
- *** Smaller percentages of growers had changed practices relating to supplemental irrigation (37%, 1710 acres), composts (29%, 100 acres), manures (43%, 195 acres), and paper mill sludges (9%, 0 acres). Interest in these technologies appears to be increasing; however, as a substantial percentage of growers indicated that they are considering making changes by using supplemental irrigation (74%), composts (41%), manures (50%), and paper mill sludges (22%). Slower adoption of these technologies probably reflects: low availability of soil amendments, costs of adoption, and the continuing need for information of the use and benefits of each technology. Growers appear to be concerned that cull potato composts may spread plant diseases to their fields.
- *** Availability of the amendments is likely to be a key factor affecting the adoption of their use. Paper mill sludges are available in the greatest volume in Maine and grower interest in their use has increased dramatically as a result of UM Cooperative Extension efforts. Applications were made on eight farms during 1996, affecting up to 1500 acres. Permits have been obtained to spread these sludges on 12 farms, affecting up to 5000 acres.
- *** Many growers provided written comments supporting the need for soil improvement through crop rotation and soil amendment use. Many also felt that supplemental irrigation would fit on a portion of their acreage. A summary of the comments is attached.

If you attended Extension programs on the following topics, how useful was the information to you? (1=Not Useful; 3=Useful; 5=Very Useful)

	<u>Mean Response¹</u>
General Soil Management	4.13 (1,27)
Soil Amendments -- Composts	
Effect on soils	4.00 (0,24)
Effect on crop yield	4.10 (0,24)
Effect on crop quality	3.78 (0,24)
Soil Amendments -- Manure	3.50 (5,18)
Soil Amendments -- Papermill Sludge	
Effect on soils	3.26 (9,16)
Effect on crop yield	3.17 (9,13)
Alfalfa Rotations	
Effect on soils	3.08 (6,12)
Effect on crop yield	3.16 (6,13)
Other Rotation Crops	3.65 (1,23)
Potato Irrigation	4.11 (1,23)

¹ The average score is presented first. The first number in parentheses indicates the number of respondents giving a <3 score (i.e. scores less than "useful"). The second number indicates the number of respondents giving a >3 score (i.e. scoring better than the mid-point).

Have you made changes in your farming operation as a result of Extension programs on the following topics?

	<u>Yes</u>	<u>If yes, total acres affected</u>
General Soil Management	87%	5120
Composts as Soil Amendment	29%	100
Manures as Soil Amendment	43%	195
Papermill Sludge as Soil Amendment	9%	----
Alfalfa Rotation Crop	27%	100
Other Rotation Crops	81%	2430
Potato Irrigation	37%	1710

If you have not made changes in your farming operation, are you considering any changes in the following?

	<u>Yes</u>
Using Cull Potato Compost?	0%
Using Other Types of Compost?	41%
Applying Manure, if Available	50%
Applying Papermill Sludge (or other high carbon material)	22%
Changing Rotation Crops	68%
Changing Rotation Length	84%
Installing or Expanding Irrigation	74%

Comments on Soil Amendments and Crop Rotation:

- 1) This grower rented a 40-acre farm that had received manure and “harvested better yields and maybe a little better quality”.
- 2) Grower is considering “using papermill sludge” as a soil amendment.
- 3) Grower feels that we “need more on sludge” (research or information, possibly).
- 4) This grower feels that “we need more talks on compost use” and that over fertilization limits productivity or sustainability.
- 5) This grower has applied compost and manure to 150 acres and has observed “better water retention, less soil-borne disease, better-shaped tubers” and “used less chemicals”. This grower is planning to “use manure in rotation with barley straw and plant potatoes only once in four years” and feels that erosion is the major factor limiting crop productivity and sustainability of potato producing soils.
- 6) Grower is applying manure on 10 acres of potato land and feels that productivity or sustainability of potato producing soils in Maine is limited by “rotations that are too short and soil organic matter that is too low”.
- 7) This grower changed crop rotation on 350 acres to “rotate more often to build up soil nutrients and slow erosion”. Plans to increase “length of rotation as land becomes available and is presently looking into irrigation”. Not enough rotation has been practiced “soil is worn out”.
- 8) Respondent rented a 30-acre farm that had been in an alfalfa crop rotation and “the ground held its soil moisture better. No difference in yield or quality”. This grower “would like to plant potatoes only one out of three years on some land” in the future.
- 9) Respondent feels that “erosion is still a problem on some soils and also that a short rotation schedule is a problem”. This grower has switched to greater use of green

manures and is looking into the possibility of planting potatoes only one year in three on some land, using papermill sludge as a soil amendment, and putting in a farm pond for irrigation.

- 10) Grower feels that "finding alternate cash crops" is the key to sustainability of potato producing soils in Maine.
- 11) Grower feels that "rotation equals better tilth, improved yields, and improved quality" and is "going to a 1:1 rotation", but that "land base needs to be increased to be able to increase the length of rotation" and improve sustainability.
- 12) This grower feels that "acreage of soil available on which to raise potatoes" limits productivity or sustainability.
- 13) This grower feels that "rotation and over cropping" limit productivity and sustainability of Maine potato soils and has increased "use of green manure legumes" on his/her farm.
- 14) This grower doesn't see any factor limiting productivity or sustainability of soils, but has "begun underseeding grain crops on 600 acres and is planning to work with better crops for the land and on going to a 1:2 rotation on some land".
- 15) To overcome limits on productivity or sustainability "Maine needs a more reliable and productive rotation crop that builds soil humus and is profitable. Over the past few years I have seen thousands of dollars sunk into useless rotations like flax. This product doesn't help the soils of Maine, but it strips the soil and puts nothing back to the farmer or the land. I hope that in the near future someone will come up with a rotation crop or plan that can be easily farmed, profitable, and better for our soils." "We are always looking for a more profitable and productive rotation crop"
- 16) Respondent feels that Maine "should be using longer rotations to lessen disease and increase quality" and that these factors limit productivity and sustainability of Maine potato soils. This grower is "trying different rotation crops and cover crops after potatoes" on his/her farm.
- 17) This grower has changed to "good rotations and has used alfalfa and manures". Plans to "try different rotation crops as recommended by extension and is still looking for the perfect rotation crop". Feels that cost of rotation land, cost of amendments and availability, and cost of irrigation are factors limiting productivity and sustainability of Maine potato soils.
- 18) Respondent has "changed liming and soil testing procedures on 650 acres of land and is using more green manure crops in rotation with potato". Is "looking at using alfalfa as one rotation crop and is thinking of going to a three-year rotation, if land is available". Feels that productivity and sustainability would be enhanced by "lengthening the number of years in rotation crops, but that this is limited by lack of available land and cash

rotation crops.”

- 19) Grower has “changed rotation practices and would rotate more if land coming out of CRP could be rented”.
- 20) Grower felt that previous rotation practices were causing compaction and has shifted back to grains grown with underseeding. In the future they may look at alfalfa and other crops. Feels that the lack of suitable cash rotation crops puts Maine at a major disadvantage.
- 21) Grower has moved from potatoes two of every three years to a 1:1 rotation. Is planning to grow barley underseeded with alfalfa as a rotation crop. Feels that stones limit the productivity of his soils.
- 22) This grower says that shifts in soil management have largely come in the area of more efficient nutrient management and feels that they need to learn more on this. In the future, “would like to experiment with different rotation crops as part of soil building process, would like to improve soil organic matter with manure, and would like to learn more about irrigation”. Feels that sustainability and productivity of Maine soils are limited by lack of “proper rotations, low organic matter content of soils, fertility of soils, low pH, availability and timeliness of water, and other poor cultural practices.”
- 23) Respondent has changed rotation crops (50 acres) and applied manure (1.5 acres) to “build organic matter into the soil and has observed that the soil retains moisture longer and has fewer lumps”. “The soil needs organic matter”, but the problem is that “manure is hard to find” in northern Maine. They are “encouraging renters to use a better rotation and are growing potatoes only one of every two to three years”. Is “interested in compost, but has not seen enough proof that potato compost is healthy”. Is not convinced on papermill sludge because of “lack of nutrients, potential contaminants, and potential for buildup”. Growers feels that they don’t have enough money for irrigation equipment or ponds. Feels that soil productivity is limited because of erosion and lack of organic matter, but that money is the key reason that potato production is unsustainable in Maine. New technologies are too expensive and profitability is not there to support purchase or improvements due to cheap food policy, lack of viable cash rotation crops, and expensive chemical inputs used in modern farming. To sum it up this growers says “I find no hope”.

Comments on Supplemental Irrigation:

- 1) Grower is considering “irrigation to help boost yield” because “soil is worn out”.
- 2) This grower is considering building a “farm pond for supplemental irrigation”.
- 3) Respondent has built a farm pond and “plans to irrigate 700 acres”.

- 4) This grower has improved "efficiency of irrigation practices"
- 5) Respondent doesn't see any factor limiting productivity or sustainability of soils, but is "working to start irrigation".
- 6) "During the fall of 1994 we built an irrigation pond and are considering that advances that irrigation will bring to our operation".
- 7) Grower has "expanded irrigation use, lengths of crop rotations, and alternative crop". Plans to continue irrigation expansion. Feels that sustainability is not limited by soils, but rather has been determined by declining markets.
- 8) Grower would "think about irrigation if suitable water source can be developed". Feels that sustainability is limited by low yielding varieties, poor rotations, and lack of irrigation.