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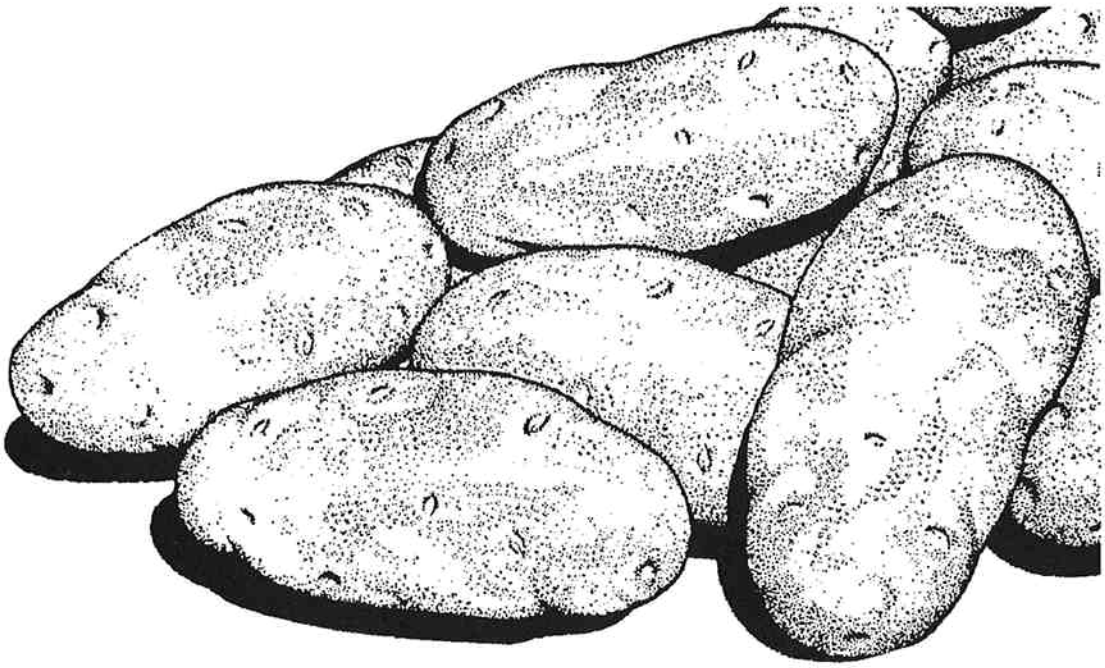
RECYCLING WASTE POTATOES ON THE FARM



MAINE AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF MAINE

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RECYCLING WASTE POTATOES ON THE FARM

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INTRODUCTION

The portion of the Maine potato crop unsuitable for conventional markets ranges from 10% to 15%, depending on growing, harvest and storage problems. Some unmarketable tubers are diverted into feed and starch; however, a high percentage of them end up on private or public dumping areas.

Open dumping is offensive because of strong odors, flies, pollution and unsightliness. When buried in public sanitary landfills, the high water content of rotting tubers results in leachate problems. The best solution to the disposal problem is to recycle the unwanted tubers on the farm by spreading and incorporating them into the soil ahead of a grass type crop. Farm recycling minimizes the objectional problems, helps maintain the physical properties of good soil, and utilizes valuable nutrients contained in the tubers.

Research done by the University of Maine between 1975 and 1979, in cooperation with the Maine Department of Environmental Protection and the town of Houlton, showed that waste potatoes released sufficient nutrients to produce high yields of millet seeded after spreading was completed. The beneficial effect of nutrient release was evident for three years. It was also observed that soil receiving regular applications of waste potatoes had vastly improved physical properties, water holding capacity, and chemical retention capacity. These benefits accrued from the added organic matter. No environmental problems resulted when the waste tubers were handled and spread correctly.

Potato tubers contain an average of 0.34% nitrogen, 0.07% phosphorus and 0.7% potassium. A ton of tubers, thus, contains 6.8 pounds of N, 3.2 pounds of P_2O_5, and 11.4 pounds of K_2O. The combined nutrient value is slightly more than $5 per ton, or about 45 cents per barrel when the value of calcium and magnesium is included. With the spreading rates recommended, additional fertilizer expenses are not required to grow a succeeding crop.

OBJECTIVES

The purpose of this publication is to outline for potato growers an on-the-farm sanitary system for disposal of otherwise unusable potatoes. The system will benefit the grower, maintain the quality of local environs and be acceptable to the public.

Summary of Spreading Conditions and Field Management:

1. The site used for spreading waste potatoes should be well or moderately well drained with no more than 8% slope. The soil should have a sandy loam or finer texture by USDA-SCS classification, and be at least 2 feet in depth. Sites should not include bottomland or portions of floodplains, and should be no closer than 150 feet from a standing body of water, a domestic water supply or the high-water mark of a stream.

2. The maximum spreading rate should not exceed 120,000 pounds (727 barrels) per acre in any year. A two-year spreading frequency is better suited to perennial grass forages as compared to an annual grasslike millet.

3. Potatoes should not be spread on frozen soil because of high snow-melt runoff. Tubers should be stockpiled over winter (see stockpiling instructions that follow) and spread when soils have thawed and will support equipment.

4. Spread tubers should be cut into the soil as soon as spreading is completed, and before the potato crop in nearby fields is emerging. The disc harrow is a good tool for incorporation.

5. After the potatoes are incorporated into the soil, a grass-type crop for forage or grain should be seeded. Legumes should not be included because they are nitrogen fixers.

6. Waste tubers that have not been thoroughly frozen will volunteer, becoming a source of disease and insects as well as lowering the yield and quality of the succeeding grass crop. They must be controlled by herbicides selective for broadleaf plants.

7. With good volunteer control, fields receiving waste at the rates suggested should be usable for tablestock- and processing-tuber production within two years. An additional year should be allowed for seed production.

STOCKPILING WASTE POTATOES

Outdoor over-winter stockpiling of waste potatoes is preferred since spreading on frozen ground is not recommended. This allows the tubers to be frost killed and partially desiccated prior to spreading. Usually waste tubers are in poor condition and need to be removed from the warehouse as soon as possible. Tubers should be moved to the stockpile while there is still a high probability of several hard freezes (25°F). April 10 in southern Maine and April 30 in northern Maine are the latest dates good freezes can be expected. Table 1 shows the probabilities of hard freezes at various Maine locations. Waste tubers removed from storage when freezing is improbable should be spread directly on the field, but will require treatment for volunteers.

Table 1. Probability of Hard Freezes (25°F) at Several Maine Towns (Source: USDA)

TOWN	67% PROBABILITY	50% PROBABILITY
Caribou	April 15	April 20
Corinna	April 21	April 26
Fort Kent	April 28	May 3
Houlton	April 16	April 21
Millinocket	April 18	April 23
Old Town	April 16	April 21
Portland	April 8	April 13

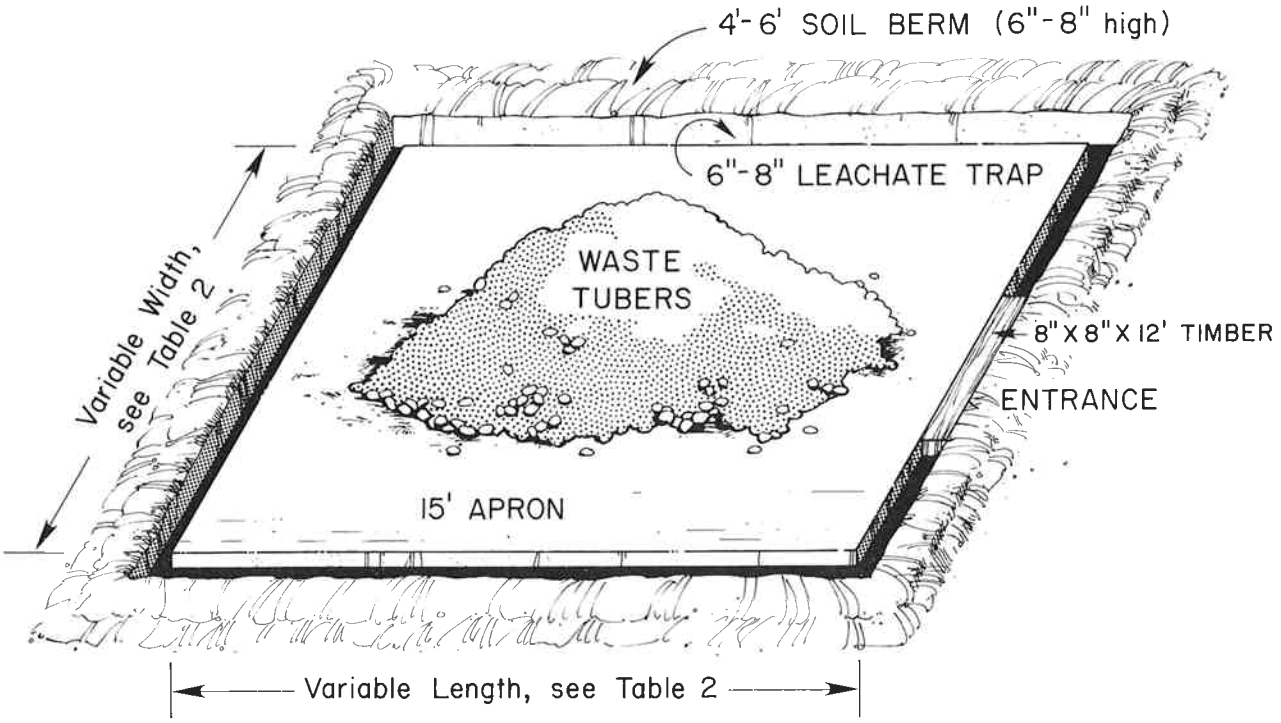
STOCKPILE COMPOUND LOCATION AND CONSTRUCTION

It is essential that effluent from potato breakdown in the stockpile be confined within the immediate stockpile area. Four basic requirements must be considered in locating and building a winter stockpile compound: (1) a deep, well-drained soil on low slope is needed; (2) the compound must be of a size to handle the expected volume of waste tubers; (3) the compound must be accessible during the winter; and (4) leachate must be retained within the compound by a simple inexpensive method. Soil quality for the compound is the same as for land on which tubers are spread except for slope location and steepness. The slope should be nearly level (0-3 percent) and the compound should be located at the top of the slope so runoff toward the compound is minimized. These slope positions also retain less snow.

Table 2 gives the minimum compound size for 100 and 1000 barrel waste tuber lots piled at various depths. Growers should select a lot size to handle the worst situation, probably 10% of harvest, rather than the average-year problem. A 15-foot border is needed to work around the tuber pile. Winter access to the compound should be easy if it is within 1000 feet of tuber storage buildings. A trough and low-berm perimeter are sufficient to keep pile leachate within the compound. They are easily constructed with a standard moldboard plow, operated in a direction that leaves the furrow inside the berm. The furrow serves to catch leachate from the pile, and the berm will filter any leachate that might overflow the furrow.

Table 2. Recommended Minimum Area Dimensions for Stockpiling Discarded Tubers at Various Pile Depths

Depth of Tubers, Feet	*For 100 Barrels*		*For 1000 Barrels*	
	Sq. ft.	Dimensions, Feet	Sq. ft.	Dimensions, Feet
1	2,400	40 x 60	10,000	100 x 100
2	2,200	40 x 50	6,400	80 x 80
3	1,800	40 x 45	4,900	70 x 70
4	1,600	40 x 40	4,225	65 x 65
5	1,500	39 x 39	3,600	60 x 60



TUBER STOCKPILE COMPOUND

SPREADING AND FIELD MANAGEMENT

Waste potatoes should be removed from the stockpile compound and field spread as soon as soils have thawed and firmed up enough to support equipment in the spring. The spreading area should be 150 feet from open water, a stream, or a domestic water supply, and should not include any floodplain area. The field slope should be 8% or less. Table 3 lists soils that are suitable for spreading at two different rates. Spreading sites downwind and as far as possible from residential areas are preferred because there is usually a brief period between spreading and the time when tubers can be worked into the soil.

Spreading rates are determined by nitrogen content of the tubers, quality of the soil, and ability of the succeeding crop to utilize nitrogen as it is released. The best soils can handle 400 pounds of nitrogen per acre, which is equivalent to 120,000 pounds of tubers per acre.

Farm-manure spreaders, front-end loaders, dump trucks and tractor grader blades are satisfactory equipment for spreading waste potatoes. The bucket volume of a front-end loader is a good way to measure the amount of potatoes applied per acre. Manure spreader and dump truck beds are also sized in cubic yards. One cubic yard of potatoes equals 6.6 barrels, or about 1,090 pounds. Therefore, 110 cubic yards equals 120,000 pounds of tubers, the maximum spreading rate. Since tubers usually shrink 25 to 30 percent on the stockpile, 75 cubic yards is a more realistic maximum spreading rate.

The potato waste should be spread uniformly over the spreading site and allowed to desiccate only as long as necessary to get good traction for incorporating them into the soil. Any farm tillage tool such as a disc harrow, vibrashank, rotavator, or plow will do a good job of working the tubers into the

soil. When tubers have been worked into the field soil, the field should be seeded to non-legume forage or hay mixtures. The purpose of the grass crop is to utilize nitrogen released from decaying potatoes. The forage produced should be cut when ready and taken off the field as green chop or hay. It will make an excellent animal feed when cut at the proper stage of maturity.

The area where potatoes were stockpiled over the winter should be re-leveled as soon as all waste potatoes are removed, and managed in the same way as the field on which tubers were spread.

Table 3. Maine Soils Suitable for Waste Potato Spreading at Indicated Per-Acre Rates[1]

727 barrels or 120,000 lbs. per acre per year	500 barrels or 83,500 lbs. per acre per year
Bangor sil	Belgrade sil/fsl
Becket fsl	Buxton sil
Berkshire 1/fsl	Conant sil/1
Canton fsl	Crary fsl
Caribou 1/sil	Dixmont sil
Charlton fsl	Elmwood fsl
Hartland sil/fsl	Howland 1
Marlow fsl	Linneus (> 15 ins. deep)
Paxton fsl/1	Nichoville sil/fsl
Perham 1/sil	Mapleton (>15 ins. deep)
Plaisted 1/sil	Peru 1/fsl
Salmon sil	Thorndike (>15 ins. deep)
Suffield sil/fsl	Skerry fsl

[1]For Soils not listed or for minor acreage soils, check with the Soil Conservation Service for suitability.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