

PLANT & PEST ADVISORY

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Frost Tillage: A Management Option

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New Jersey farmers are typically pressed for time when performing field operations in the spring. For many crops, it is advantageous to plant as early as possible, but soil wetness prevents timely field preparation. Wetter soils are therefore often tilled in the fall to save time in the spring and improve soil drying, while allowing for more effective freeze/thaw action. Due to wet soil conditions in summer and fall, many soils become compacted by field traffic and fall tillage is not possible. **Frost tillage** may be an attractive option which reduces the spring and fall work load and has some additional advantages. We have recently initiated experiments to evaluate the feasibility of this practice and the results appear promising.

Frost tillage involves primary tillage when the soil has a 1 to 3-inch frozen layer at the surface and is tillable below it. The frozen layer should be thick enough to provide support to the field equipment, yet is still thin enough to be readily ripped by the tillage implement. We have experimented with a chisel implement which is probably most appropriate for this practice. In general, conditions for frost tillage occur after several (dry) days and nights of considerable frost following a period of thaw (no snow cover and unfrozen soil). During this time, the freezing process draws water from the underlying soil layer into the frozen zone, often resulting in the formation of ice lenses. The frozen zone therefore stores water in ice form, while the soil layers below it dry out and become "tillable."

When planning on performing frost tillage, it is important to ensure that the frozen layer is adequate for support of equipment *and* the soil under the frozen layer is dry enough for tillage. Otherwise, compaction damage may result. It is recommended to dig through the frozen layer at several locations in the field to verify these conditions. Soil under the frozen layer should fall apart readily when rubbed. If instead the soil forms a ball when squeezed, it is unfit for tillage. Frost tillage conditions do not occur frequently during the winter season. Typically, they occur on about 3 or 4 days per year during the winter in New Jersey. Frost tillage leaves a very rough soil with plates of frozen soil randomly oriented on the surface. Upon thawing, the soil becomes

SEE FROST TILLAGE ON PAGE 2



INSIDE

Frost Tillage: A Management Option 1

Estimating Manure Application Rates 2

Practices Which Affect Disease Levels of Wheat 3

Wildlife Damage Resources .. 3

Weekly Weather Summary 4

Resource on Cover Crops 4

supersaturated and will gradually mellow out, still leaving a rough surface. In many cases, only light secondary tillage is required in the spring to facilitate planting.

The following are some of the potential advantages of frost tillage:

- Shift of spring or fall workload to the winter. This may be especially advantageous for early season crops when a wet fall and/or spring delays tillage.
- Reduced soil compaction because field equipment is supported by the frozen layer.
- Improved soil drying in the spring.
- Improved water infiltration and reduced runoff potential due to greater soil roughness after tillage which increases surface storage and reduces the potential for uniform refreezing and sealing.
- Reduced need for pre-plant soil packing, because soil has already settled and mellowed naturally by spring time.
- Possibility for incorporation of winter-applied manure which reduces manure losses to streams during winter and early spring when snow melt and rainfall on frozen/saturated soil cause high runoff volumes. It may also provide for a time window to apply and incorporate stored manure when odor nuisance is reduced due to decreased volatilization potential and less outside activity of neighbors.

Some potential disadvantages of frost tillage are:

- Increased power requirements to till the frozen layer (estimated up to 20%).
- Increased erosion potential on highly erodible soil. Despite reductions in runoff, the loosened soil may be more subject to erosion if runoff still occurs during heavy spring rains. This can be reduced with appropriate crop residue management.
- Predictability of appropriate conditions for frost tillage. It is still not clearly defined which weather and climate conditions allow for frost tillage and how often such conditions occur.

Research on frost tillage is underway at Cornell.

Submitted by Joseph Heckman,
Ph.D., Soil Fertility □

Estimating Manure Application Rates

Brian Aldrich, Agricultural Outreach Specialist, North Jersey Resource Conservation & Development Council

As harvest begins and your fields start to open up, many of you with livestock will start spreading manure in earnest. Estimating the rate at which you apply manure gives you one more piece of information to use in management decisions. (If you don't know what you've got, you can't make decisions about what to do with it.) For example, you may want to apply more or less manure to different fields, depending on their fertility. Calibration gives you more control, so that fields will not be under-manured nor over-manured. Here are three different ways to calibrate your manure spreader.

The first we'll call the "recordkeeping" method. Every time you spread a load on a field, check it off on a piece of paper. When you have finished covering the field uniformly, divide the total number of loads you spread by the number of acres in the field. That will give you the number of loads spread per acre. Multiply this by the capacity of your spreader in tons per load. The result will be your spreading rate in tons per acre.

The second method we'll call the "plastic sheet" method. Cut a sheet of thick plastic to a known size, such as 5 ft. x 5 ft. (25 square feet). Fold the sheet up and weigh it on a milk scale. Then lay the plastic down in the field and drive over it while you're spreading manure. Fold the plastic up carefully with the manure in it, and weigh it again. Subtract the first, empty weight from the second, full weight. That gives you the pounds of manure spread on 25 square feet. Multiplying that number by .87 gives you your spreading rate in tons per acre.

The last method we'll call "truck scales". Weigh the entire manure spreader when it is full by driving it up onto a pair of portable truck scales. Spread the load, then weigh the spreader again empty. Use a walking wheel to trace the area spread and determine how many square feet were covered. The pounds spread per square foot can then be converted to tons spread per acre.

The advantages of the recordkeeping method are that it requires no extra equipment, and it is the most accurate. The disadvantage is that you won't know what your spreading rate is until you have finished covering the field.

The advantages of the plastic sheet method are that it gives you an immediate answer, and it is inexpensive. The disadvantage is that it is less accurate, because the estimate may vary greatly depending on if you hit the plastic at the beginning, middle, or end of the spread. This disadvantage can be overcome to some degree by measuring several loads and taking the average. Making repeated measurements will show you how much variation there is in your spreading, but of course it will take longer.

The advantages of the portable truck scales are that they are faster, and they give you a better average. The average is better because you are measuring the distribution of the entire load, as opposed to just the area hit by one plastic sheet. Truck scales are faster because their greater accuracy means fewer trials are required. Truck scales also provide a better measurement of your spreader's capacity than you will get from the manufacturer's literature. The disadvantage of truck scales is that they are expensive.

SEE RATES ON PAGE 3

Practices Which Affect Disease Levels of Wheat

Daniel Kluchinski, Mercer County Agricultural Agent

In most years, wheat diseases are the most common pest problems that can reduce wheat yields or test weights. Often, chemical control can be used, but this can be expensive and reduce overall profits, or weather conditions are often such that spraying at the right time is difficult. Before wheat varieties are selected and planted this fall, take time to review the best management practices to follow to reduce potential losses.

There are six practices which can affect disease levels next spring. These include the use of resistant varieties, crop rotation, tillage system, fertilizer applied, planting date and fungicide seed treatment. Some of these practices influence disease levels greatly, while others have only a slight effect. The effects of these practices on the more common diseases of wheat are listed below.

Wheat spindle streak mosaic virus: The use of resistant varieties is the principal means of control, with delayed planting resulting in good control when susceptible varieties are used. Plowing and disking all vegetation and crop rotation provide moderate control. Balanced fertility has a slight effect and seed treatment has no effect on disease levels.

Barley yellow dwarf virus: Delayed planting is the principal means of control. Resistant varieties and balanced fertility have a slight effect and the other practices have no effect on disease levels.

Seedling blights: Seed treatment is the principal means of control, with delayed planting providing moderate control. Crop rotation, plowing and disking, and the use of a balanced nutritional program have a slight effect. No resistant varieties are known.

Powdery mildew: The principal means of control is the use of resistant varieties. The use of seed treatments and refraining from the use of high nitrogen rates provides good control. Delaying planting has a slight effect, and crop rotation and tillage have no effect.

Leaf rust: Resistant varieties is the principal control measure and seed treatment provides good control when the disease appears early in the season. Delayed planting provides slight control and no control is possible with the other practices.

Tan spot: The principal control measures include crop rotation and conventional tillage. Resistant varieties, balanced fertility and seed treatment provide slight control. Delayed planting provides no control.

Septoria leaf spot and glume blotch: Resistant varieties, crop rotation, conventional tillage and seed treatment provide moderate control. Balanced fertility provides slight control and delayed planting provides no control.

Wildlife Damage Resources

Three recent factsheets on wildlife damage are available from Rutgers Cooperative Extension: Who to Call Regarding Wildlife Damage (FS887), Portable Electric Fencing for Preventing Wildlife Damage (FS888) and High-Tensile Woven Wire Fences for Reducing Wildlife Damage (FS889). Contact your County Agricultural Agent.

Also, fencing is still available through the NJ Department of Agriculture's Deer Fencing Program. Contact your Rutgers Cooperative Extension County Agricultural Agent for the current application.

To be eligible to receive deer fencing under this joint initiative, an applicant must be:

- A New Jersey farmer having documented proof of a minimum of \$40,000 in sales or agricultural commodities produced by the applicant on their New Jersey farm.
- A farmer with a federal identification number.
- The owner of the land upon which the fencing will be erected.

NOTE: A New Jersey farmer listed on the Division of Fish, Game and Wildlife's existing list as of 12/1/97 is automatically eligible for the initial distribution in this program regardless of the two previous requirements and does not need to submit application to this supplemental program. However, those with applications pending at FG&W after 12/1/97 must fill out this application to be eligible for this supplemental allocation of fence. □

RATES FROM PAGE 2

You don't have to pick one "best" method to calibrate. You can try two or more methods and compare the results as a cross-check. Recalibrating once a year is another good way to check that you are getting reliable numbers. If you change equipment or the type of manure you spread, you should also recalibrate.

For more information, contact me at North Jersey RC&D at 908-852-2576. Remember, if you can't measure it, you can't manage it! □

Take all: Crop rotation provides excellent control, and balanced fertility and delayed planting provide good control. Conventional tillage provides slight control, and resistant varieties and seed treatment provide no control.

Head scab: Rotation to crops other than corn or sorghum, conventional tillage and seed treatment all provide moderate control. Delayed planting provides slight control and none of the other factors affect control.

Loose smut: Seed treatment provides excellent control and resistant varieties provide slight control. The other factors do not affect disease level.

For additional information on resistant varieties, fertilization rates and other cultural methods, contact your county agricultural agent. In addition, the 1998 wheat variety yield trial data is available through your county Extension office. □

Weekly Weather Summary

Keith Arnesen, Agricultural Meteorologist

Temperatures averaged much above normal. Extremes were 95 degrees at Pemberton on the 28th and 31 degrees at Charlotteburg on the 24th. Weekly rainfall averaged 0.42 inches north, 0.48 inches central, and 0.24 inches south. The heaviest 24 hour total was 0.98 inches at New Brunswick on the 21st to the 22nd. Estimated soil moisture, in percent of field capacity, this past week averaged 69 percent north, 66 percent central and 38 percent south. Four inch soil temperatures averaged 64 degrees north, 66 degrees central and 68 degrees south.

Weather Summary for the Week Ending 8 a.m. Monday 9/28/98

WEATHER STATIONS	RAINFALL			TEMPERATURE				GDD BASE50		MON
	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	.62	32.88	4.70	88	37	62.	3	2945	357	74
CANOE BROOK	.36	31.48	1.85	91	37	66.	6	3388	785	68
CHARLOTTEBURG	.28	33.91	3.99	87	31	61.	4	2495	434	59
FREEHOLD	.57	32.20	4.75	92	39	66.	4	3218	377	72
LONG BRANCH	.44	36.08	8.30	91	40	65.	3	3066	281	68
NEW BRUNSWICK	1.13	31.11	3.18	91	39	65.	3	3268	297	86
PEMBERTON	.20	23.58	-4.55	95	37	69.	7	3542	629	36
TOMS RIVER	.17	37.09	8.68	93	38	66.	5	3368	579	38
TRENTON	.37	27.80	1.38	92	38	65.	2	3166	73	55
CAPE MAY COURT HOUSE	.19	24.42	-.23	93	43	68.	3	3411	574	23
DOWNSTOWN	.33	24.14	-1.69	92	38	67.	4	3485	374	42
HAMMONTON	.09	22.32	-4.84	94	37	68.	5	3453	371	28
POMONA	.17	25.98	1.49	93	40	68.	6	3437	575	32
SEABROOK	.17	26.32	1.41	92	44	68.	4	3657	525	38
ATLANTIC CITY MARINA	.47	27.67	4.07	85	52	70.	6	3470	611	35
WOODSTOWN	.51	26.00	-0.62	92	39	69	NA	3684	NA	NA
WES KLINE — GDD BASE 40 PINEY HOLLOW										
Last Week 238 (Ending 9/21/98)										
This Week 192 (Ending 9/28/98)										

New Resource on Cover Crops

The Sustainable Agriculture Network has published the new edition of *Managing Cover Crops Profitably* which shows how to use cover crops to add bottom-line farm savings while safeguarding natural resources.

The book documents the potential benefits and practical aspects of using cover crops to provide on-farm fertility, protect soil and manage pests.

There's information from field trails, lab tests and farmer experience in all types of climates. The critical details of growing and killing cover crops are tied to broader questions of rotation design and selecting the best species. Comprehensive species descriptions, fact-filled charts and valuable resource lists guide newcomers and give experienced crop farmers new horizons.

Chapters focus on eighteen top cover crops, selected for their all-purpose usefulness across many farming

regions. Range maps and line drawings give quick help on application and recognition. Chapters feature: benefit highlights of the species, with traits such as soil builder or weed suppresser described carefully, with published references and farm experience; and specific management requirements such as soil preferences, seeding rates in various mixes and regrowth tendency.

Also included are best routes for killing each species and handling residue, pest management helps and comparisons with other cover crops. The book is fully indexed and lists seed suppliers, regional experts and information resources.

The book is available for \$19.00 from Sustainable Agricultural Publications, Hills Building, University of Vermont, Burlington, VT 05405-0082. Include your mailing address and a daytime telephone number. □

Editor's Note: This is the last issue of the Field Crops edition for the '98 season. Thank you for subscribing to the Plant & Pest Advisory.

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