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FIELD APPLICATION OF ASH BY MANURE SPREADER

James J. Boedicker

During October of this year, ash demonstration plots were set up on several farms within 25 miles of Grand Rapids. Establishment of these plots is part of a research project begun at this station with the establishment of small ash research plots in the fall of 1985. The project, funded in part by the Blandin Foundation, is aimed at evaluating the agronomic value and environmental aspects of using Blandin Paper Company wood waste/coal ash as a lime and/or fertilizer source. Leading the project is Dr. David Rabas, Station Agronomist. Cooperators include David Hyland, Itasca County Extension Agent, and this writer.

The source of the ash being used in the project is Blandin's Steam Co-Generation Plant. Currently, this plant is producing 40 to 70 tons of ash per day. Previously, this material has been disposed of in the Itasca County Sanitary Landfill.

The agronomic benefits of ash have long been recognized. Blandin ash contains about 30 pounds per ton of potassium; appreciable amounts of magnesium, sulfur and iron; and smaller amounts of phosphorus and trace elements. Also, its calcium content is such that 2½ tons is equal to about one ton of agricultural lime in its ability to reduce soil acidity (increase soil pH). The particular mix of elements in Blandin ash would actually appear to make it a nearly ideal fertilizer and lime source for alfalfa production in north central and northeastern Minnesota. (Results in 1986 from the station's small plots suggest the above to be indeed true.) The sandier soils in this part of Minnesota, that would otherwise be suited to production of a drought resistant forage like alfalfa, are typically acid and low in potassium, magnesium and sulfur. Presently, alfalfa is not being grown on many of these sites because of the high cost of liming. Where it is grown, yields are often half of potential.

Another phase of the project has been to investigate equipment and methods appropriate for large-scale field application of ash. In late summer and early fall we tested both a box-type manure spreader and a commercial, truck-mounted lime spreader. These tests showed both types of equipment capable of doing an effective job of applying ash on a large scale. Of the two, however, it appears at this time that a

manure spreader is the more practical choice for the following reasons:

1. Most forage producers have, or have access to, a box-type manure spreader and a front-end loader and can apply ash themselves.
2. Except for weather factors, the producer would have full control as to time of application, provided an adequate supply of ash were already stockpiled at the farm.
3. The producer would have more direct control of application rates.
4. Costs would appear to be considerably lower than for commercial application.

The manure spreader we have tested is a New Holland Model 679. This spreader is 5 feet wide by 16 feet long and has a single beater. It holds 3½ to 4½ tons of ash when loaded with a slight crown above the top of the sides. One problem found in preliminary tests with this spreader was that, during unloading, at least half of the ash sheared at random from the rear of the load and dropped directly to the ground without being contacted by the beater. This problem was solved with the installation of a fine/slurry manure pan (a New Holland spreader option). This pan encloses the lower half of the beater and extends under the rear edge of the spreader box floor. In

solving the ash drop problem, the addition of this pan has also resulted in greater "localized" uniformity of spread. (The need for such a pan on other spreader makes and models would depend on the position of the lower beater with respect to the rear edge of the floor.)

As with other materials and "broadcast type" spreading equipment, the two primary considerations in applying ash with a manure spreader are uniformity of coverage and conformity with desired application rates. Uniformity is mainly a function of (1) the shape of the distribution pattern obtained from a single pass and (2) the actual swath width used in spreading (distance between centerlines of adjacent passes). For the New Holland spreader, we determined the shape of the pattern by making passes over a row of collection pans placed perpendicular to the direction of travel. These tests revealed a "bell-shaped" distribution pattern with an effective spread width of about 10 feet. (The amount of ash collected in pans five feet out from both sides of the centerline was about half that collected at and near the centerline.) The effective spread width determines the maximum swath width that can be used in spreading while keeping lateral nonuniformity within "acceptable" limits. This width can vary from one

Continued on page three



Spreading ash with manure spreader.

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Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.

DEVELOPING BLUEBERRY POTENTIAL IN NORTHERN MINNESOTA

II. NEW COMMERCIAL PLANTING OCCURRING

David K. Wildung

Progress in the blueberry project at North Central Experiment Station since our last **Quarterly** report (February 1985) has been dramatic. There are activities in three major areas which are leading to our goal of seeing a commercial blueberry industry developed in Minnesota. The three areas are in field research at NCES, grower-based demonstration and economic studies, and education-extension type programs to assist new growers or interested people in getting started in blueberry production.

The objective of experiment station research has been to solve cultural management problems. A lot of this research has been done directly at NCES while other research has been done cooperatively with St. Paul campus colleagues.

Three separate winter protection studies were conducted during the 1985-86 winter. Snow depth can be critical to successful fruit production. In northern Minnesota 12 to 18 inches of snow cover will probably be needed to insure reliable fruit production and greater amounts of snow will allow for maximum fruit production. Six inches or less snow cover under conditions in northern Minnesota will not kill the blueberry plants, but fruit production will not be reliable. Utilization of protective coverings such as straw, burlap, clear or white polyethylene or Reemay (spunbonded polyester) could help improve productivity when snow cover is less than 12 inches.

Planting date studies have indicated that early fall (Aug. 15 to Sept. 15) may be satisfactory for planting blueberry plants. Also early spring planting of dormant plants (before May 15) is more desirable than planting in late May or June. The long term effect of nitrogen fertilizer is also being evaluated. Nitrogen application rates need to be greater on plants mulched with sawdust than those not mulched. However, after three growing seasons it appears that the rates of nitrogen fertilizer necessary for early plant development and production may not be as high as earlier recommended.

Cooperative research has led to release of a third blueberry cultivar, Northcountry, in 1986. We are currently increasing other better breeding lines for further evaluation and possible cultivar release. Comparison of Northblue tissue culture produced plants and conventionally propagated plants has shown tissue cultured plants develop more early lateral branching and produce fruit at an earlier age than conventionally propagated plants. As the plants get older the difference in productivity appears to be less. Early production of plants produced by either method of propagation has been desirable, but tissue culture produced plants may have an early advantage. We

have been working with Plant Pathology to identify blueberry disease problems. Progress has been made in disease identification and a spray program will be developed for the 1987 season.

Grower based demonstration and economic studies have provided much practical information. Eight grower cooperator sites are being utilized (5 planted in 1983; 1 each in 1984, 1985 and 1986). Four sites are located in the Twin Cities area and four located in west central and north central Minnesota. Two of the plantings fruited in 1985 and all but the 1986 planting fruited in 1986. The three most productive sites produced between 1500 and 2500 pounds per acre in their fourth growing season which is ahead of our earlier projections. All sites have been a valuable source of economic information. This information has been used to help prospective growers understand production costs and cultural management practices better. Two publications summarizing these studies were released this year. They are Ag Folder 2902 "Establishment Studies with Minnesota Blueberries" and Ag Folder 2903 "Blueberry Establishment Calendar."

In addition to the economic information, these grower locations have been utilized for experimental and demonstration studies. Soil amendment studies using peat and sulfur are at two farms. Both have produced similar results and added much to our understanding of soil pH modification where soil pH is too high or the soil type is too heavy for optimum blueberry production. Two other farms are being used for evaluating nitrogen rate and time of application. Information obtained from our station research plots is being used this winter in demonstration studies conducted

on four farms. Planting date and winter protection systems are the subject of these demonstration studies. Grower sites have also been used successfully the last two years for summer field tours. Prospective growers have gained much from the grower field tours. The value of these grower-cooperator plantings cannot be emphasized enough in development of a blueberry industry.

The third important area of the blueberry program has been the educational aspect. This program has been a joint effort between NCES and the University of Minnesota Extension Service and was initiated in 1985. Experiment station staff have provided the leadership in training county extension agents, providing educational materials and answering questions. County Extension Offices now have the information available to help prospective blueberry growers get started. Many county agents have had meetings and helped individuals get started with blueberry production. In 1986, Dave Trinkka was hired to work directly with County Extension Offices and potential or existing blueberry growers. His office is at NCES and he has provided a valuable link between University research-extension and the grower. The educational aspect of our blueberry program has enabled us to come in contact with people who are excited about developing a commercial blueberry industry in Minnesota.

Our current blueberry mailing list includes over 250 people. In September the group was surveyed. I would like to share a few things we have learned from that survey to show you the excitement among these growers. Over 60 percent of the surveys were returned. Of the group returning surveys, 61 are presently growing



Blueberry growers tour at NCES

blueberries, 37 are preparing to grow blueberries and 56 are still interested in growing blueberries commercially but have not planted any yet. Among those growers responding, there have been over 54,000 plants planted since 1983 when Northblue and Northsky were first released. Since the educational programs started in 1985, over 11,000 plants were planted in 1985 and over 36,000 planted in 1986. The total since 1985 represents between 25 to 30 new acres planted. The largest planting among the reporting growers is about 4 acres, so we have many small half acre plantings. This type of small grower is indicative of the type of agriculture develop-

ing in northern Minnesota.

Through the years the blueberry project has had funding from several sources. The University of Minnesota Agricultural Experiment Station has supported the project from the beginning. Early support from the Blandin Foundation enabled propagation and initial grower-cooperator plantings to be established. Governors Council for Rural Development funding has been used to develop the educational programs used since 1985. Future funding is being requested to carry this program further.

Currently we have been able to establish credibility with the growers. We need to maintain that credibility. We also need to

continue to answer cultural questions in the areas of winter protection, irrigation, disease control, soil modification and fertility. Helping growers develop Pick-Your-Own ideas for their farms and potential for retail sales or alternative blueberry processed products are important challenges ahead. If we can continue to solve these problems there appears to be a bright future for continued growth of the commercial blueberry industry in Minnesota.

If you are interested in obtaining additional information about commercial blueberry growing contact North Central Experiment Station.



New pickup and animal trailer recently purchased for North Central Experiment Station.

FIELD APPLICATION OF ASH BY MANURE SPREADER continued

spreader design to another. Application rate, on the other hand, is a function of the actual swath width used and the ratio of ash output rate to spreader (tractor) travel speed. Ash output rate, in turn, is a function of ash density (dry), apron chain speed and cross-sectional area of the load. All of these variables must be appropriately matched to obtain desired rates of application.

In lieu of complex calculations or trial and error, a simple formula has been developed to aid farmers in determining how to adjust and operate their own manure spreaders to achieve desired ash application rates. Until an appropriate fact sheet can be developed, farmers needing help with this problem should feel free to call David Hyland at the Itasca County Extension Office or me at 327-4490.

The on-farm demonstration plots, which

are up to one acre each in size, have been set up either on existing alfalfa stands or on sites being prepared for alfalfa establishment next spring. The manure spreader described above has been used in applying ash to these plots at all except one of the demonstration sites. On existing stands, ash was applied at target rates of 5 and 10 tons per acre, primarily to demonstrate its value as a topdress fertilizer. On newly prepared sites, we used target rates of 10 and 20 tons per acre to demonstrate the value of ash as both a fertilizer and lime source. A "check" strip was left at all sites for comparison purposes.

We deeply appreciate the support and cooperation we have received on this project from all concerned. Watch for more information on this subject in subsequent issues of this publication.

NORTH CENTRAL FOUNDATION FUND PROGRESS

In the February 1986 issue of the **Quarterly** the North Central Experiment Station Foundation Fund was discussed. The fund has been organized through the Minnesota Foundation located at the Minneapolis campus of the University of Minnesota. The purpose of the North Central Foundation is to provide funds for non-line item research, or research that would not normally be funded at NCES.

Development Officers from the Minnesota Foundation, Dianne Hennes and J. Quinn Tierney, have met with members of the Foundation committee in the last months. Committee members are Margaret Matalamaki, chairperson; Robert Frick, Todd Driscoll; Max Fulton; John Suffron; Harold Kosbau; Anne Huntley; Loren Solberg; Bart Heitke; Dave Radford and Jan Evensen. Since the North Central Foundation will benefit the area served by the NCES, committee members were selected from north central and north-eastern Minnesota. Members are from

Grand Rapids, Bovey, Mora, Cloquet and Effie.

Contributions made to the North Central Foundation are tax deductible and may be in the form of cash or property. All monies contributed may be set aside for a specific purpose by the donor. There are several ways donations can be spent by the North Central Experiment Station. The entire donation can be spent, the principal can be set aside and only the interest spent, or partial withdrawals can be made from the donation.

Former students, and anyone who has benefited from the North Central School and Experiment Station are encouraged to get more information. Contact Dianne Hennes at the Development Office, 201 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108, or call 612-624-4777. Please be sure any contributions are designated for the North Central Experiment Station Foundation.

You can receive information from Dr. Joe

Rust or Dr. Robert Nyvall at the North Central Experiment Station, 218-327-4490. Return the form below for more information on the North Central Experiment Station Foundation Fund.

Please send me more information on the NORTH CENTRAL EXPERIMENT STATION FOUNDATION FUND.

Name _____

Mailing Address _____

City _____ State _____ Zip Code _____

I have been associated with the North Central Experiment Station as:

alumni former employee

Other, please list _____

RETURN TO: Dr. Robert F. Nyvall, Supt.
University of Minnesota
North Central Experiment Station
1861 Hwy 169 East
Grand Rapids, MN 55744

ROBERT F. NYVALL, SUPERINTENDENT

The summer seems to have flown by and fall is fast disappearing as of this writing. Many things have happened at the North Central Experiment Station since the last **Quarterly** came out.

Dr. Dave Rabas has been conducting a study using wood ash as a fertilizer and substitute for lime on alfalfa. This has been the first year of the study where ash from the Cogeneration plant is spread on alfalfa at various stages of growth. Dave and Dr. Jim Boedicker, Station Ag Engineer, and Dave Hyland, Extension Agent, are cooperating in applying the ash to several farmers' fields in the area. To date the results from the plots look promising. Maybe what was essentially a waste product will be a valuable commodity for local farmers.

Other research conducted by Dr. Dave Wildung and Kay Sargent has demonstrated rather conclusively that a good snow cover is necessary for survival of blueberries and to insure a good crop the following summer. Blueberry production promises to be economically feasible in the future for many growers in northern Minnesota.

We are currently in the process of searching for a new research position in forestry for the station. This position became open with the retirement of Bill Cromell last June. As in most cases where a national search for a PhD occurs, it takes time. However, we hope to begin interviewing candidates by March of 1987.

The new addition to the station of the Hauser property continues to be developed, slowly but surely. Logging will begin this winter and should be completed in two years. Agronomy alfalfa plots have been established. We have a capital request in to the legislature for a new storage building and agronomy field laboratory for the property.

Another new addition to the station is the building of a one-mile and a three-mile cross country ski trail in our forestry research area. Additionally, a one-mile nature trail will be constructed next spring.

These were built in cooperation with the Itasca Trails Task Force Committee. These cross country ski areas and nature trails were the brain child of our forestry Research Plot Coordinator Tim O'Brien and his helper Dan Buchman. These trails are not necessarily research but educational not only from the sense of the birds, animals and plants seen on the trails but to make people in northern Minnesota and particularly Grand Rapids aware that the Experiment Station belongs to them. We hope these trails will be an enjoyable experience and invite everyone who is interested to use them; not only individuals, but school classes and teams and other groups. The trails will be well marked and there is plenty of parking. Enjoy.

Other odds and ends from around the station include Joe Rust's trip to China in October, the bowling team is striving to be in the top half of their league this year, and we have added a new pickup and animal trailer. The pickup replaces a 1975 green pickup that was held together by rust. Bill Creamer our junior scientist in animal science, shot his bear during the season. A new rug will soon join Bill's boa constrictor and dogs in the house.

COMING EVENTS

Dairyman's Day
January 14, 1987, Cloquet

International Wild Rice
Association Meeting
January 22 & 23, 1987
Grand Rapids

Beef Cow-Calf Day,
January 27, 1987, Itasca
Community College, Grand Rapids

Visitors Day
July 16, 1987, NCES

Horticulture Night
August 26, 1987, NCES

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DAIRYMANS DAY JANUARY 14

The annual Dairymans Day program for this area will be held at the University of Minnesota Cloquet Forest Experiment Station instead of at Grand Rapids. The date is Wednesday, January 14, 1987.

Featured topics on the program will include tips on improving A.I. technique and herd fertility by Dr. Jeff Reneau and improving production and profits with balanced dairy rations by Jim Linn.

BEEF COW-CALF DAY JAN. 27

Beef Cow-Calf Day will be held at Grand Rapids in the Itasca Community College Davies Hall theatre again this year on Tuesday, January 27, 1987. Topics of interest to beef-cow calf producers will include discussions on feeding, breeding and parasite control.



**WE WISH YOU A
HAPPY
HOLIDAY
SEASON**

*The North Central Experiment
Station Faculty & Staff*



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