FROM THE GROUND UP

Cooperative Extension
Colorado State University
Department of Agronomy
Fort Collins, Colorado 80523
(303) 491-6201
FAX: (303) 491-0564

AGRONOMY NEWS

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TABLE OF CONTENTS

COMPOSTING LIVESTOCK MANURES

Because of concern about Colorado groundwater quality, more attention has recently focused on the quantity of manure applied to soils. The transportation costs associated with hauling manure have resulted in some producers having more manure than can be safely spread in close proximity to feedlots.

A growing number of producers are interested in composting manure as a way to reduce waste volume, comply with the new Confined Animal Feeding Regulations, and perhaps even turn waste into profit. Composting is a biological process in which microorganisms convert organic waste, such as manure, into a soil-like material. It is the same process which causes decomposition of any organic material, only it is managed to control the balance of air and moisture, and the proportion of carbon to nitrogen so that materials decompose faster.

During composting, some N is lost from the manure as ammonia is volatilized. Most of the remaining N is tied up within stable organic compounds which will become slowly available in the soil. Composted manure has less odor and is easier to haul and store than raw manure because the volume and weight can be reduced by 50% or more. The

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composting process produces heat, driving off excess moisture while killing pathogens and weed seeds. For maximum efficiency, pile temperature during composting should be maintained between 80° F and 130° F. Most seeds and disease-causing organisms cannot survive 130° F for more than three days.

Benefits of On-Farm Composting
Dry end-product that is easily handled
Excellent soil conditioner
Reduced risk of pollution
Reduced pathogens and weed seeds
Reduced odor
Saleable product

Disadvantages of On-Farm Composting
Time, money, energy required
Ammonia lost to volatilization
Slow release of nutrients
Land and machinery requirements

Farmers considering composting manure must first analyze the investment in equipment, labor, and management required, and weigh these in relation to the potential market for the compost or the need to reduce waste volume. In general, production costs range from $5 to $25/cu yd of compost and the market value of the finished product ranges from $5 to $50/cu yd. It may be possible to begin composting with little more than a front end loader and a small patch of land. It is also possible to invest over $200,000 in a large windrow turning machine. Concerns about polluting ground or surface water may also require the site to be properly engineered and surfaced. This may be avoided by locating the composting area away from wells and where runoff will not directly enter surface water. Vegetative filter strips around the perimeter can help control runoff from the site.

Fresh manure is an excellent composting material but is generally too wet and nitrogen-rich to be composted rapidly without adding a dry, high carbon amendment. However, bedded pack manure is usually dry enough and has a good C:N ratio. Proper moisture content and C:N ratio are the most important aspects of composting.

Microorganisms require C as a substrate for growth and N for protein synthesis. A C:N ratio of 30:1 is desirable, with an acceptable range of 26-35:1, depending on the material used. Moisture control is probably the most difficult aspect of large scale composting in Colorado. If moisture falls below 40%, decomposition will be aerobic but very slow. If moisture is above 60%, anaerobic decay occurs and foul odors can be a problem. At the proper moisture, the composting material should yield water when squeezed, but should not compact or feel soggy. Adding more dry, high-carbon materials, shaping the windrow to either shed or absorb water, covering the pile, turning more or less frequently, and wetting the pile are all techniques that can be used to adjust moisture levels.

Recommended Conditions for Rapid Composting

Carbon to nitrogen (C:N) ratio	25:1 - 30:1
Moisture content	50 - 60%
pH	6.5 - 8.0
Temperature (°F)	130 - 140
Particle size (diameter)	⅛ - ½"

While composting allows the application of more manure on less land, producers should carefully analyze the returns to labor and capital that they will receive. If no suitable alternative exists for complying with

environmental regulations, or if a significant market for compost is unsatisfied, then it may be an excellent way to utilize manure. Be sure to determine if any local zoning or environmental regulations are in effect prior to establishing a composting facility. It is probably best to start composting on a small scale, using existing machinery such as your front end loader or manure spreader to windrow and turn the manure, before buying more specialized machinery.

An excellent resource entitled "On-Farm Composting Handbook" was published in June, 1992 by the Northeast Regional Agricultural Engineering Service. It is written for the practitioner and should enable farmers to decide if composting is appropriate for their operation. The handbook can be obtained for $15 by writing to: Cooperative Extension, Riley-Robb Hall, Ithaca, NY 14853-5701. ▫Waskom

QUICK METHOD TO DETERMINE WHEAT YIELDS

There is no easy way to estimate wheat yields other that the "guess" system. This system is not accurate. The following appraisal method is moderately accurate if each "counting site" is selected at random and enough replications are used.

Appraisal Method after Heading

1. Select 2 to 3 foot length of row and count heads. Determine number of heads per square foot of row.

2. Determine average number of kernels per head. Select 5 heads from average head height and count kernels.

Repeat 3 to 4 replications, plus one more every 30 to 50 acres.

Number of heads to count - Five average height heads.

ANH	=	Average number of heads per square foot
ANK	=	Average number of kernels per head
AKSQ	=	Average number of kernels per square foot
YF	=	Yield factor
	=	22 for plump kernels or 25 for shriveled wheat.
BPA	=	Bushels per acre

$$BPA = \frac{AKSQ}{YF}$$

Example:

Length of row - 16 inches
Width of row - 14 inches
Number of heads in 16 inches = 45
Number of kernels per head = 30
Square foot = 144 square inches

16 inches X 14 inches = 224 square inches area harvested

(45 X 144)/224 = 28.9 heads per square foot
28.9 X 30 kernels per head = 867.8 kernels per square foot

867.8/22 = 39 bushels/acre

This method of yield estimation is commonly used and can be fairly accurate when used properly. ▫Croissant

EFFECT OF ANHYDROUS AMMONIA ON SOIL

Does anhydrous ammonia (NH_3) kill soil bacteria and will it eventually make soils hard?

After NH_3 injection (Table 1), the bacteria count is reduced but rebounds to higher levels within a few days. Bacteria that are two inches away from the injection point are not significantly effected by NH_3. The fungi count is reduced at the injection point for a longer period of time than the bacteria count (Table 2). However, the fungi count is not effected at 2 inches away from the injection point.

Soil moisture, soil temperature, fertility, pH, and organic matter are factors which could change the responses from NH_3 injection. Does NH_3 cause the soil to become more compacted? A 20 year long experiment was conducted during 1969-1988 in Kansas to evaluate the effect of four nitrogen (N) sources on the physical and chemical properties of soil. Four N sources (anhydrous ammonia, ammonium nitrate, urea ammonium nitrate (UAN), and urea) were applied annually to field plots at four locations. After 20 years of treatments, the field plots were sampled to determine the physical and chemical properties. The two soil layers that were sampled were the 2.5 to 5.5 inch and the 8.5 to 11.5 inch layers. Chemical and physical test results showed no significant chemical or physical property differences of either soil layer among the four N sources. The results show that N source selection should be based primarily on cost of the N applied, adaptability of the source to the producer, tillage system, and availability. All N sources are agronomically equal on a per pound of N basis when they are properly applied.

Table 1. Effect of NH_3 on soil bacteria (original count - 2,250,000 bacteria per gram of soil)

	Days		
Inches Away	0	3	10
Injection Point	260,000	7,200,000	8,400,000
1"	4,600,000	6,400,000	5,400,000
2"	2,300,000	3,000,000	2,000,000

Table 2. Effect of NH_3 on soil fungi (original count - 20,130 per gram of soil)

	Days			
Inches Away	0	3	10	24
Injection Point	6,130	10,260	14,380	7,130
1"	18,130	15,500	13,260	12,630
2"	19,250	18,260	16,000	20,13

CANOLA UPDATE

Canola trials at the Agricultural Research Development and Education Center (ARDEC) were planted March 29. On June 7, about 10% of the field was initiating flowers. If you planted canola in April or early May you may begin to see flower initiation soon. The yellow flowers will be arranged like a small head of broccoli during the early bloom season. Once flowers initiate, growth is rapid and full flower will occur within two to three weeks depending upon weather. As wheat and barley begin drydown, I expect to see an increase in aphid, thrip, plant bug, and lygus populations in the canola. You will probably notice an increase in bee activity and should keep this in mind if you plan to spray the field. If you see plants failing to set seed, look for a discoloration on the stem. Black sclerotia on the stem may indicate white mold problems. Many empty pods or misses on the plant may indicate excessive heat and flower drop. You should swath the canola at 90% maturity. Bring lots of duct tape for the combine and truck (to patch any holes). Canola must be stored at 13% or below moisture content.

AGRI-TIMES, a marketing journal, (May 21,1993) has information about three Japanese trading companies that are looking to the United States to increase purchases of canola. Mitsubishi, Sumitomo, and C. Itoh Trading Companies are looking for production, primarily in the Pacific Northwest. Unfortunately, they do not know about Colorado's canola crop - yet. In the years I have worked on canola, the quality has been excellent here in Colorado and, in many cases, we get more and higher quality oil than the Pacific Northwest.

Mitsubishi, who also manufactures cars, purchased 100,000 metric tons of canola last year from the Pacific Northwest. They want 200,000 acres over the next 10 years and experts in the area doubt their ability to deliver. Apparently, the Japanese have been buying canola from around the world and prefer U.S. quality. That, plus the declining value of the dollar, make U.S. canola desirable. The experts seem to agree there is no problem selling a canola crop. Andy Thostensen of Spectrum Crop Development Corp. (Ritzville, WA) says the markets are well established and it is easier to sell the crop today than ever before. ¤Johnson

NEW STATE SEED LAW

A new seed law in Colorado was established on June 3, 1993. New and significant changes in this law are:

All those selling seed, conditioning seed, or labeling seed must be registered with the Department of Agriculture. Registration fees will be between $25 and $200 depending on the class of the seedsmen. These registrations and fees will begin in early 1994.

All seed offered for sale must be tagged with a current label stating germination, purity, and a variety name. Current in this case means the germination test must be less than one year old.

It is illegal to sell seed protected under the Title V clause of the Plant Variety Protection Act, and that seed advertisements cannot use the terms *foundation*, *registered*, or *certified* unless the seed has been certified by the official seed certifying agency.

All seed sold in Colorado shall be free of noxious weed seeds and have less than 2% total weed seeds. The noxious weed restrictions must be followed in all seed transactions.

Violations of any of these acts in the law can result in stop sales, and criminal or civil penalties. Civil penalties can range up to $2,500 per infraction and can be assessed automatically by the Department of Agriculture in the form of a fine.

Where trade names are used, no discrimination is intended, and no endorsement by the Cooperative Extension Service is implied.

All of the above points are in the law to protect the seed buyer by insuring that he is not misled by the seller.

A new section of the state seed law allows for arbitration of disputes between buyer and seller. This mechanism provides that any dispute involving seed performance can be heard by a panel of individuals involved in the Colorado Seed Trade. Any disagreement could therefore be settled without involving legal fees or court time. The law will be enforced by the State Department of Agriculture.

Complete copies of the seed laws and its rules and regulations will be available from the Colorado Seed Growers office or the State Department of Agriculture soon. ▫Stanelle

CONTRIBUTING AUTHORS

Croissant, Robert L.,
Extension Agronomist - Crops
Colorado State University
Follett, R. Hunter,
Extension Agronomist - Soils,
Colorado State University
Johnson, Duane,
Extension Agronomist - Alternate Crops,
Colorado State University
Stanelle, James R., Manager,
Colorado Seed Growers Association
Waskom, Reagan M.,
Extension Agronomist - Water Quality
Colorado State University

Sincerely,

Robert L. Croissant

Robert L. Croissant
Editor
Extension Agronomist - Crops