FROM THE GROUND UP

Cooperative Extension
Colorado State University
Department of Soil and Crop Sciences
Fort Collins, Colorado 80523
(970) 491-6201
Fax: (970) 491-2758
Web address:http://www.colostate.edu/Depts/SoilCrop/

AGRONOMY NEWS

Volume 17, Number 9 September 1997

TABLE OF CONTENTS

USING YIELD MAPS EFFECTIVELY

Some producers in Colorado have equipped their combines with yield monitors and global positioning systems allowing them to generate yield maps of their fields. Once they have calibrated the yield monitor, verified GPS accuracy, and are satisfied that the GIS software generates accurate maps, the question arises about what to do with the map.

In some cases, obvious trends will allow producers to identify causes of yield variation. Occasionally, yield patterns will be due to a problem which can be corrected, such as poor drainage or irrigation water distribution. In other cases, yield variability may not be readily explained by obvious field features.

Research conducted at the University of Nebraska by Richard Ferguson and Gary Hergert illustrates this point. Their work focused on site-specific nitrogen management where they monitored corn yield patterns in a field for four years (1993-96). The field was furrow-irrigated, level and apparently uniform. Even though weather influenced the overall yield averages from year to year, yield patterns were similar in 3 of 4 years - 1993, 1995 and 1996. These yield patterns over years were very similar to the soil organic matter pattern in the study, as determined by grid soil sampling. In 1995 and 1996, yield was significantly correlated to organic matter. These results are consistent with our understanding that soils higher in organic matter can be more productive. For this site, soil organic matter was a major, but unexpected, factor influencing plant growth and yield potential.

How we effectively use yield information from a field will require more research. Perhaps, developing a productivity index map for a field may provide information about managing a field spatially for increased efficiency. This information may be coupled with other sources of information, to effectively manage inputs spatially, either for increased profit or reduced environmental impact.

-Shanahan

Colorado State University

HARVEST AND POST-HARVEST

Dry edible beans must be handled gently to prevent damage that reduces crop quality. Careful harvest and post-harvest handling procedures will maintain high seed quality and strengthen the reputation of dry beans produced in Colorado. The principles of good seed handling are based on preventing physical impact during handling and maintaining seed moisture content between 11 and 14%.

Mechanical Seed Damage During Combining

To minimize mechanical seed damage and provide efficient and gentle threshing, the seed must be harvested at the proper moisture content. Seed moisture content should be between 13 and 15% at harvest. Higher moisture seeds can be harvested, but must be dried or aerated in storage to prevent heating and/or deterioration. A seed at 10 % moisture is very difficult to combine without mechanical damage, whereas seed at 14 % moisture can be harvested with very little damage. The producer's best option to manage seed moisture during harvest is timely harvest operations to ensure that the seed is not overly dry at the time of threshing.

Another critical factor to reduce seed damage during harvest are combine adjustments. Two important adjustments are cylinder or rotor speed and concave clearance. High rotor or cylinder speeds increase seed damage. It is not possible to recommend specific rotor or cylinder speeds, because combines differ in design and capacity. A general rule to follow is to operate the combine at the slowest cylinder or rotor speed that effectively threshes the seed. With conventional cylinder combines, set the concave cylinder clearance approximately 1.5 times the seed width. Close settings will increase seed damage and wide settings will allow pods to pass through the machine unthreshed. The type of cylinder bar can also influence threshing efficiency. Do not use chrome plated or new bars to thresh beans, as sharp edges on the bars will increase seed damage. Specialty bars with every-other rasp removed can improve performance and reduce seed damage. Rotary combines with specialty dry bean rotors and appropriate lug configuration a found to provide excellent threshing and separation of dry beans.

Openness of the concave can also influence threshing efficiency. Open concaves incur less seed damage than closed concave screens, particularly in good threshing conditions. Most combines have provisions to remove wires or rods from the concave to increase the size of openings between concave bars. A more open concave will allow seed to move through the concave area sooner, thus reduce the possibility for mechanical seed damage. Operate the combine at uniform full capacity during harvest. Seed threshed at or near full combine capacity will incur less seed damage than at partial capacity because the plant residue acts to cushion the seed as it passes through the combine.

Mechanical seed damage should be monitored changes are made in combine settings and as field conditions change. Seed damage can be measured by visual inspection of the seed and by an evaluation of water soaked seed. The soak test is an easy method to evaluate seedcoat damage that is not apparent by visual inspection. This test is done by taking three or more random seed samples of approximately 100 seeds from the combine hopper or storage bin. The samples should be visually examined for mechanically damaged and broken seeds and seeds with insect or disease damage removed from the sample. Place the seeds in a cup of water at room temperature for approximately 5 to 10 minutes, then pour off the water and count the beans with wrinkled seed coats. Wrinkled seed coats are indicative of damaged seed coats that are not apparent from visual inspection. Divide the number of seeds with wrinkled seed coats by the total number of seeds placed in the cup and multiply by 100 to obtain the percentage of seed with seedcoat checks. Mechanical damage to seedcoats reduce seed quality, especially for

HANDLING OF DRY BEANS

canners. Tests using the soak test indicate that re is generally 3 to 5 times more damaged seeds found by the soak test than with a visual examination. Therefore, when you visually find mechanically damaged seeds, much more seed has damage to the seed coats.

Post-Harvest Seed Handling

Seed handling after it leaves the combine is also important. The primary factors that determine vulnerability to damage during post-harvest handling and storage is also seed size and moisture content. Large seeded beans are more sensitive to damage than small seeded types and damage increases as seed moisture content decreases. Beans should never be allowed to drop long distances while they are being moved. Discharge distances from the combine to the truck and from the truck to the elevator pit should be reduced to a minimum. Cushion the fall from the combine to the truck by cing sleeves on the combine discharge chute. To slow the fall from the truck into the dump pit, use a bean ladder or gently sloping chute. While moving beans during the storage and handling process, utilize padded bean ladders and sleeves to slow the fall at every discharge site. Be especially careful when handling beans with low moisture content or during cold weather because the seeds are very brittle under these circumstances. Seed damage should be assessed throughout the handling and storage process using the soak method.

The most important considerations during seed storage is protection from water and contamination from other crops, chemicals, rodents, insects, and temperature extremes. Beans should always be stored away from pesticides or other toxic substances, because the seed will take on odors of the storage environment. Storage bins must be cleaned and aired prior to filling.

Moisture content of beans should be 14 to 16% for short-term storage and 11 to 14% for long-term storage. Beans that have higher moisture content will require aeration or drying during storage. Drying systems control the rate of drying by the rate of air flow and the degree of drying by the relative humidity of the air entering the system. Storage systems for commercial beans grown in Colorado do not usually require heated air due to our low relative humidity and because the crop is relatively dry at harvest. Air movement in the storage bin can be accomplished by pulling the air downward through the beans in an "aeration system", or forced up through the beans in a "drying system". The aeration system exhausts the warmer interior air directly out of the storage bin with few condensation problems. The aeration system is designed to cool the beans and remove some moisture, but it is not designed to reduce seed moisture significantly. Drying systems that are designed to reduce seed moisture push air up through the seed. As the air is pushed up through the seed, the air picks up moisture and can cause condensation at the top of the bin. Condensation develops if air flow is too slow or the relative humidity of the air entering the system is too high and can cause seed discoloration and rotting if not removed by drying. Therefore, drying systems and seed bins must be carefully monitored during aeration to ensure safe efficient seed drying. Proper ventilation and structural design must be considered to prevent injury or death of operators.

Brick

CONTRIBUTING SPECIALISTS

Mark A. Brick
Extension Specialist-Bean Production
Jessica G. Davis
Extension Specialist - Soils
Duane L. Johnson
Extension Specialist - New Crops
Jerry J. Johnson
Extension Specialist - Crop Production
Sandra K. McDonald
Extension Specialist - Pesticides
James T. Self
Manager - Soil Testing Laboratory
John F. Shanahan
Extension Specialist - Crop Production
Reagan M. Waskom
Extension Specialist - Water Quality

CLINTON ADMINISTRATION LAUNCHES NEW INITIATIVE TO INSTALL CONSERVATION BUFFERS

Agriculture Secretary Dan Glickman recently announced that the USDA is committed to helping landowners install 2 million miles of conservation buffers by the year 2002. The National Conservation Buffer Initiative is led by the USDA Natural Resources Conservation Service (NRCS) in cooperation with other USDA agencies - including the Farm Service Agency, Cooperative Extension Service, and the Forest Service.

Conservation buffers are areas of land maintained in permanent vegetation to intercept pollutants or sediments. Buffers can be installed along riparian corridors or at the margins of crop fields. They can also be used at strategic locations on nonagricultural landscapes, including urban areas.
Cargill, ConAgra, Farmland Industries, Monsanto,

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Sincerely,

John T. Shanahan

John Shanahan
Extension Specialist

Pioneer Hi-Bred International, and Terra Industries have pledged nearly $1 million over the next three years to complement USDA's efforts to promote conservation buffers. The National Corn Growers Association, National Council of Farmer Cooperatives, and other groups are working with these corporations to help educate, encourage, and enable producers to install buffers.

The continuous signup for the Conservation Reserve Program (CRP) is one opportunity to use buffers to protect fragile areas of a farm. Producers do not have to make an all-or-nothing choice about bringing land out of CRP. They can crop the best land and put the rest in buffer strips. If the whole field is not accepted for CRP, they may consider establishing buffers and enrolling them into the CRP through the continuous signup program. The Wildlife Habitat Incentives Program; Wetlands Reserve Program; Environmental Quality Incentives Program; and other Federal, State, and local programs also offer both technical and financial help.

The NRCS will be making an aggressive effort to get conservation buffers installed on agricultural land in Colorado. Cooperative Extension can play an important role in helping to educate producers on the environmental benefits of grass filter strips and buffer zones on areas subject to excessive runoff.
cc Waskom

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UNITED STATES DEPARTMENT OF AGRICULTURE
COLORADO STATE UNIVERSITY
FORT COLLINS CO 80523

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