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

Volume 14, Number 2 February 1994

TABLE OF CONTENTS

ENVIRONMENTAL AND PESTICIDE EDUCATION SPECIALIST KATHRYN APLEY

Dr. Kathryn Apley, a new addition to the Agronomy Department and Cooperative Extension, started February 1 as the Environmental and Pesticide Education Specialist. This full-time Extension position resulted from splitting the position held by retiring Dr. Bert L. Bohmont, Coordinator Pesticide Programs, with the Department of Plant Pathology and Weed Science. Kathryn will be responsible for providing leadership for environmental issues and pesticide education. She will also be in charge of implementing the provisions of the federally-funded Pesticide Impact Assessment Program (PIAP)and Pesticide Applicator Training (PAT).

Please give Kathryn a call (303/491-6201) if you have any suggestions or needs on how this new position can best serve you. Her office is PC8 in the Plant Science building.

Kathryn grew up on a dryland wheat farm in Central Kansas. She received a B.S. in Agronomy and Ph.D. in Weed Science from Kansas State University. Her M.S. degree was in Weed Control from Oregon State University. Besides helping her parents with daily farming operations, Kathryn's work experience includes a mixture of both university and industry positions. During her graduate programs, Kathryn assisted in herbicide research on potatoes, onions, and mint at the Malheur Experiment Station near Ontario, Oregon; and on corn, soybeans, sorghum, and wheat at the Ashland Agronomy Farms near Manhattan, Kansas. Industry experience includes the following: 1) summer intern positions in field herbicide research with Ciba-Giegy and pesticide sales with BASF, 2) technical service representative for American Cyanamid in Colorado, Kansas, and southeast Nebraska, and 3) support staff for the appraisal department of Farm Credit Services.

Please join us in extending a warm welcome to Kathryn and John.

They can be reached through the main Extension Agronomy office number, (303)491-6201.

Kathryn's husband, Mike, is a veterinarian with a Ph.D. in clinical pharmacology. Mike works with Delbert Miles D.V.M. at Greeley, CO, as a beef feedlot consultant for herd health. For fun, they enjoy mountain biking or drag racing Mike's 1969 Chevy Camaro.

EXTENSION SOIL SCIENTIST - JOHN MORTVEDT

Dr. John J. Mortvedt has a temporary appointment as Extension Soil Specialist until July 1, 1994.

John was a soil chemist with the National Fertilizer and Environmental Research Center, TVA, Muscle Shoals, Alabama from 1962 to 1992. He was mainly involved with research, development, and use of micronutrient fertilizers. He also studied the environmental effects of fertilizer use and helped develop related Best Management Practices (BMPs). In 1992, he was transferred to Fort Collins as coordinator of TVA programs with land grant universities and the fertilizer industry in the Rocky Mountain states. When the TVA National Field program was cancelled in 1993, he was retired.

John was raised on a general livestock farm in eastern South Dakota. He received his B.S. and M.S. degrees in Agronomy from South Dakota State University in 1953 and 1959, respectively. He received his Ph.D. degree in soil chemistry from the University of Wisconsin in 1962.

John and his wife, Marlene, live in Fort Collins. Call him at 491-6201. His office is PC2 in the Plant Science building.

Important Criteria for Dry Bean Variety Selection

Careful consideration should be taken when selecting a dry bean variety. Primary criteria to consider are: 1) varietal susceptibility to prevalent diseases in the production region, 2) length of time from planting to harvest maturity, 3) yield potential, 4) varietal growth habit, and 5) adaptation to your specific growing conditions. Information regarding the reaction of many bean varieties to the prevalent diseases in Colorado can be found in the *Colorado Dry Bean Production and IPM Bulletin* (available in the CSU Bulletin Room). Also, consult the *Technical Report TR93-8, Colorado Dry Bean Variety Performance Trials* conducted by the Crops Testing Program at Colorado State University. Consider visiting the field trials during the growing season. A list of test locations can be obtained from Dr. John Shanahan (303/491-6201), the coordinator of the Crops Testing program, or your local Extension agent.

Two good sources for information on reaction of bean varieties to prevalent diseases in Colorado are Colorado Dry Bean Production and IPM Bulletin and Technical Report TR93-8, Colorado Dry Bean Variety Performance Trials.

Resistance to foliar pathogens is a very important characteristic to consider when choosing a variety. Many new pinto varieties have increased resistance to diseases which can reduce both yield and quality. For example, the pinto variety 'Chase', recently released by the University of Nebraska, has resistance to all known races of rust in Colorado, whereas most other varieties are susceptible. The degree of damage caused by rust varies among susceptible varieties such as Othello and Bill Z. Othello may defoliate and have significantly reduced yields due to early rust infection, whereas Bill Z can tolerate rust and have minimal yield loss. Resistance to pathogens such as common blight, bacterial brown spot, white mold, and others are also important. The is no one variety that will provide resistance to all pathogens. The best approach is to first determine the disease that has the highest probability of causing yield reduction in your area and select varieties which have been developed for resistance or tolerance to those pathogens.

The harvest maturity of pinto varieties varies from about 93 days to 98 days. One of the earliest pinto varieties is Othello, while Arapaho and RS 101 are later maturing. Bill Z, UI 114, UI 126, UI 129, and most others will mature in about 95 to 97 days after planting. The management practices that you use will influence the maturity date. Irrigation late in the growing season will delay maturity. High levels of nitrogen, either applied or residual, will also delay maturity. Choose the variety with the longest maturity that fits your production practices. Longer maturing varieties also tend to have higher yield potential.

Yield potential of varieties can be evaluated by conducting your own trials, studying CSU Crops Testing Variety Trial Reports, or discussing the varietal performance with local bean elevator personnel. Consider that all cultural practices including planting date, tillage, fertilization, irrigation, and harvest practices influence the yield response of a variety. Soil compaction is a good example of a production constraint seen in many regions of Colorado in which varietal response is variable. If your soils are heavy and soil compaction is a problem, a variety that has good tolerance to soil compaction may perform better on your farm than in public tests. Strip trials conducted on your farm are also a good way to determine the adaptability of a variety to your farming practices. Make sure

that you assign the varieties to several strips in different areas of the field or farm at **random**, thus avoiding any bias in assigning certain varieties to better or poorer areas. Also **replicate** the varieties in different strips up to four times, to remove random environmental effect which could cause a bias in yield estimation. Treat all the strips similarly during the growing season to prevent differences in response due to environmental conditions among the strips.

Best Management Practice for varietal selection in beans is to plant more than one variety on your farm every year.

The growth habit of a variety is important for several reasons. Bean varieties are classified into three types: Type I = bush , Type II = upright vine, and Type III = prostrate vine. Varieties which have a Type I or II growth habit tend to have field resistance to white mold due to a porous plant canopy that keeps the relative humidity lower, thus inhibiting the development of the disease. A porous canopy is also more conducive to penetration of chemicals such as fungicides to control rust or white mold, and copper based compounds to control bacterial pathogens. Pinto varieties, such as Arapaho and RS 101, which have an upright growth habit, thus often have higher yield under moderate white mold pressure. Most pinto varieties have either a Type II or III growth habit, while Type I pinto varieties are rare. Conversely, all kidney varieties are Type I (bush). Type I varieties are more sensitive to environmental stress than Type II or III varieties due to differences in plant development between the growth habits. Type I varieties have a determinate growth habit in which the plant undergoes a relatively short period of floral development followed by completion of its life cycle. Type II and III varieties have an indeterminate development in which the plant has a longer reproductive period and the plant can continue to produce flowers as long as water and nutrient resources are available during the growing season. Consequently, if a Type I variety receives a stress (hail, drought, heat, etc.) that causes floral or pod abortion, yield losses will be severe because the plant cannot recover and compensate by producing more flowers. Type II and III varieties can recover if the stress is alleviated by producing more vegetative and reproductive organs (flowers), consequently yield losses are not as great as for Type I varieties.

The best management practice regarding varietal selection is to plant more than one variety on your farm every year. This enables you to gain experience with different varieties and provides a hedge against severe yield losses due to a pest or environmental disaster that affects one variety more than another. Be careful when you interpret your observations and experiences to consider the varieties' performance relative to both the seasonal and spacial environment in which the varieties were grown. It is a good idea to grow the varieties several years over several locations prior to making any generalizations about which variety is best for you. ▫Brick

SOIL TESTING SEASON FOR SPRING CROPS

Now is the time to prepare for the spring season by taking samples for soil tests. Soil should be sampled if it is not frozen, or as soon as possible after thawing. Subsoil samples are suggested for a better estimation of nitrate-nitrogen in the soil profile. Soil samples taken from a 0-2 foot depth are recommended for corn.

Advantages of early spring sampling are that there is more time to obtain and send in samples and receive soil test results and fertilizer recommendations. This allows more time to plan your fertilizer program for spring crops.

The CSU Soil Testing Laboratory routinely tests soils samples for nitrate-nitrogen, available phosphorus, potassium, zinc, iron, extractable copper and manganese, as well as soil pH, soluble salts, organic matter content, estimated lime percent, and soil texture. Cost for the routine soil fertility test is $15 per sample. Costs for other tests are available on request.

Soil test results allow the farmer to better evaluate the fertility status of a given field. Proper credits should be taken for the nutrient applied in manure, in previous legumes, and in irrigation water. Fertilizer recommendations can then be tailored to the expected yield of the crop to be grown on that field, resulting in more efficient use of the fertilizer.

Plan ahead - early spring soil sampling helps complete your fertilizer program for spring crops.

Soil testing is the first step in an effective fertilizer program. Judicious use of fertilizers will increase profitability and should not adversely affect groundwater quality.
▫Mortvedt, Self

LABORATORY SCIENCE JOINS THE NEW CROPS PROGRAM

Development of high quality, biodegradable plastics derived from starchy crops like potatoes appears nearer. Scientists at Michigan State University are "growing" a plastic called PHB (polyhydroxy-butyrate) which is chemically similar to starch and polypropolene. Proposed uses include containers, wraps, and coatings. The researchers at MSU are currently inserting the necessary genes into *Arabidopsis*, a distant relative of canola and broccoli. The Arabidopsis grows the plastic in its stems, leaves, and roots. Arabidopsis only grows about 1 to 2 inches tall and produces plastic at a rate of one-tenth of one percent by weight - hardly a commercial venture. The genetic engineers feel strongly that with some tinkering, they can get potatoes (and perhaps corn and barley) to produce PHB instead of starch. The plant should be able to utilize PHB because of its chemical similarity to starch. Currently, PHB is commercially available in Europe and is used as a biodegradable plastic bottle. PHB is a natural plastic product derived from a soil bacteria, *Acaligenes eutrophus*, and sells for $12/lb as opposed to the chemically similar polypropolene derived from petroleum at $0.50/lb. Bacteria are not efficient producers of organic compounds while plants are. Now if they can concentrate those genes into tubers and kernels....

Scientists at the USDA National Center for Agricultural Utilization Research (NCAUR) in Peoria, Ill. have begun human testing of a soluble fiber extract from oats and barley called beta-glucan. Beta-glucans function as fat replacers and are unlike other compounds (primarily starches) which serve a similar function. The commercially available product is called Oatrim. In a test, volunteers consumed a diet with 30% of the calories from fat, Oatrim supplied another 10% of the calories, sugars and starch accounted for 45% of the calories, and protein, the remaining 15%. About half cup of Oatrim was consumed daily. Since beta-glucans are gums, they were easy to incorporate as one-fourth the fat

replacement in foods such as muffins and cookies and all the fat in pancakes and waffles. The substitution was not as successful in products like Jell-O, yogurt, gravy, soups, spaghetti sauces, and fruit juice. This was due primarily to a change in consistency, not flavor. Because beta-glucans are gums, they give a creamier, "fatlike" texture to foods than similar starch-based fat substitutes. One gram of Oatrim equals one calorie while one gram of fat equals nine calories. In the study, volunteers had a substantial drop in LDL-cholesterol without affecting beneficial HDL-cholesterol. Their glucose tolerance increased, insulin levels dropped 11 to 24 %, and blood glucose levels dropped 7 to 12%. Most volunteers were eating more calories than normal and lost an average of 4.5 lbs. Beta-glucans and amylodextrins from the oats combine to absorb water forming a gel, giving a feeling of fullness. After the tests were completed, volunteers found their blood sugars and cholesterols returned to pre-test levels. Exclusive licenses have been given to two major corporations for oatrim. Hopefully, additional development of barley (the "other" primary source of beta-glucans and amylodextrin) can be developed. Colorado oat and barley production could increase dramatically with the release of these products. ▫Johnson

Beta-glucans function as fat replacers. One commercially available product is called Oatrim. One gram of oatrim equals one calorie while one gram of fat equals nine calories.

Information was derived from Agricultural Research, a publication of the USDA-ARS (December, 1993)

FEDERAL PESTICIDE RECORDKEEPING REQUIREMENTS

Private pesticide applicators, ie., farmers and others applying restricted use pesticides on their land, must abide by regulations stated in the 1990 Farm bill. The inception of these regulations on 9 May 1993 consists of facts you must record for each restricted use pesticide (RUP) used. The Law requires you to record:

1. The brand or product name of the RUP and its Environmental Protection Agency (EPA) registration number.
2. The total amount of pesticide applied. This applies to the quantity of product used before it is diluted and applied.
3. The size of the area treated. This is recorded as square feet, acres, hectares, bushels, cubic feet, number of animals, or other recognized units.
4. The crop, commodity, stored product, or site to which the pesticide is applied.
5. The location of the application. This refers to the location of the treated area as indicated by county, range, township and section, maps, written descriptions, or a USDA identification system used by the ASCS or SCS. Special provisions are written for spot treatments.
6. The day, month, and year of application.
7. The applicator's name and certification number.

Most farmers who apply RUP pesticides such as rootworm insecticides, herbicides, stored grain pesticides, and many other products, are included in the provisions stated in the farm bill.

Record sheets have been developed as an aid to complete these requirements. In Colorado, the *Crop Production And Pest Management Field Record* forms are designed to aid farmers and other chemical users to keep records required when applying RUP. This information must be kept on file for a period of two years and be available for inspection on demand by the Agricultural Marketing Service (AMS).

The four page layout is designed to permit the user to record all necessary items for field management purposes along with Restricted Use Pesticide information.

These forms are available from the Bulletin Room at Colorado State University or your County Extension Office. ¤Croissant

Look for the Agronomy News Index (1993) in next month's issue.

CONTRIBUTING AUTHORS

Apley, Kathryn L.,
Extension Agronomist - Environmental and Pesticide Education,
Colorado State University
Brick, Mark A.,
Extension Agronomist - Bean Production,
Colorado State University
Croissant, Robert L.,
Extension Agronomist - Crops,
Colorado State University
Johnson, Duane,
Extension Agronomist - Alternate Crops,
Colorado State University
Mortvedt, John J.,
Extension Agronomist - Soils,
Colorado State University
Self, James R., Manager,
Colorado State University Soil Testing Laboratory

Sincerely,

Robert L Croissant

Robert L. Croissant
Editor
Extension Agronomist -Crops

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