FROM THE GROUND UP

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AGRONOMY NEWS

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MEET SANDRA McDONALD

Sandra grew up on a small family beef farm in Chester, South Carolina, where she helped with the cattle and the family garden. After graduating from Chester Senior High School she attended Erskine College in Due West, SC, where she earned her BS degree in Biology with a minor in English. She attended Clemson University for her MS in Plant Pathology. She then spent two years serving with the US Peace Corp with the Plant Protection Division of the Royal Thai Department of Agricultural Extension. As Agricultural Projects Coordinator of the Chombung Rural Development Center in Western Thailand, Sandra remained in Thailand another year. Upon returning to the US, she pursued her PhD in agronomy/ weed science at the University of Florida.

On October 1, 1996 Sandra joined CSU as an Environmental and Pesticide Education Specialist, primarily working with the Department of Bioagricultural Sciences and Pest Management. She also works closely with the Extension Soil and Crop Sciences Department. ☛McDonald

WISHING JOHN MORTVEDT WELL

We would like to take this opportunity to thank John Mortvedt for all the invaluable service that he provided to the Soil and Crop Sciences Department and Cooperative Extension over the past four years. He has worn several hats during his tenure in the Department, most recently as interim Pesticide Coordinator, and filled them all extremely well. He worked hard and diligently at updating Extension publications in soil management. He contributed significantly to many other Extension program activities. His leadership in developing the Certified Crop Advisers (CCA) Program for Colorado is especially appreciated, and it is safe to say that without his initiative the program would not have attained its current status. John will continue to serve on the state CCA board and as the CSU representative to the Rocky Mountain Plant Food and Ag Chemicals Association. We have all benefited considerably from our association with John. We wish John and his wife Marlene well in their retirement. ☛Shanahan

Colorado State University

WHEAT SEED LICENSING PROGRAM

Halt wheat may have had a strong showing in the field this past summer, it yielded right up there with TAM 107 and it provided resistance to the Russian Wheat Aphid (RWA) as well. But for many of us who have been involved with this variety over the last two or three years, the success in the field may be secondary to the success of the Halt Certified Seed licensing and distribution program. Colorado State University, Colorado Wheat Research Foundation, Colorado Seed Growers Association and selected certified seed growers are cooperating in the release of Halt in a program that could become a model for varietal releases in Colorado in the future.

Only existing certified seed growers will be allowed to participate in the production of these new varieties.

Certified seed growers pay royalties generated from a one cent per pound fee figured into the price of certified seed. The Colorado Wheat Research Foundation (CWRF), who owns the variety, will turn over the vast majority of these licensing fees to Colorado State University and its wheat variety development programs. CWRF is protecting its rights to Halt by including the variety in the Plant Variety Protection Act, and is vigorously enforcing these rights.

Halt Certified Wheat was produced on more than 1000 acres this past summer, giving the potential of royalty payments of $15,000 to $25,000. Since this is the first real production year for Halt, this is a tremendous beginning of a program that could positively impact the wheat production potential of Colorado.

The Agricultural Chemicals and Groundwater Protection Act (SB90-126) mandates secondary containment and mixing/loading pads for large pesticide bulk storage facilities beginning September 30, 1997.

Halt Certified Wheat Seed is only the beginning of a program that could eventually encompass all public varieties grown in the state. In 1997, CSU and CWRF will probably release three, new varieties (derivatives of TAM 107, Yuma and Lamar) that will have RWA resistance under a similar licensing program. Only existing certified seed growers will be allowed to participate in the production of these new varieties. Since Colorado annually plants about 2.5 million acres of wheat, and these varieties can only be grown as certified seed, the need for certified seed is likely to increase dramatically in the next few years. Therefore, any farmer interested in growing seed who has planted Foundation or Registered seed of any wheat variety will have to apply for certification of next year's crop to qualify. The time to sign up as a certified seed producer of the new varieties is limited to two years after release, and potential growers must produce certified seed in 1997 or 1998 to qualify.

Further information on producing seed of the new varieties or becoming a certified seed grower can be obtained by calling Colorado Seed Growers Association at 970/491-6202. ☛Stanelle

MANDATORY PESTICIDE BULK STORAGE AND MIXING/LOADING AREAS

The Agricultural Chemicals and Groundwater Protection Act (SB90-126) mandates secondary containment and mixing/loading pads for large pesticide bulk storage facilities beginning September 30, 1997. Since it is less than one year until the Colorado Department of Agriculture begins inspection of these facilities, operators that fall under this regulatory requirement need to start planning how they will comply.

Farm operations, chemical dealers, and chemical applicators that handle pesticides in bulk (containers larger than 55 gallons liquid or 100 pounds dry) will be required to construct secondary containment and a mixing/loading pad. Facilities that handle only DOT 57 or MACA 75 approved mini-bulk containers of up to 660 gallon capacity will be exempt from secondary containment requirements. However, if 500 gallons of liquid product or 3000 pounds of dry product in any size container is handled annually at one location, an approved mixing/loading pad is required by the law.

Cooperative Extension has worked with the Colorado Department of Agriculture to develop educational fact sheets and approved plans for the construction of these facilities. Free copies may be obtained through Mitch Yergert at CDA (303/239-4151) or from Reagan Waskom at CSU (970/491-6201).

Provisions of the containment requirements include:

- Bulk storage of agricultural chemicals must be in an impervious secondary containment structure

capable of containing a discharge. Capacity of secondary containment must be 125% of the volume of the largest tank in the containment structure.

- Mixing/loading of agricultural chemicals must be performed on an impervious pad capable of containing a discharge.

- Capacity of a mixing/loading pad is 150% of the volume of the largest container (up to 1200 gallons) using the pad. Pads serving containers holding more than 1200 gallons need only be designed to the 1200 gallon container standard.

Professional development funds have been obtained and registration fees will be waived for all Cooperative Extension staff attending.

- Discharges to secondary containment or mixing/loading pads must be promptly recovered.

- Secondary containment structures and mixing/loading pads must be maintained as impervious over their service life.

- Chemigation systems in compliance with the Colorado Chemigation Act are exempt from mixing/loading pad regulations. Tanks storing agricultural chemicals at a chemigation site will be covered by secondary containment regulations only if they exceed 5,000 gallons in capacity.

If you are unsure whether an operation must comply with these regulations, we have developed a checklist to assist in this determination that I will be happy to mail or fax to you upon request. ☛Waskom

INTEGRATED CROP MANAGEMENT WORKSHOPS

Theoretical and practical aspects of soil, crop and pest management will be the topics of the 1996 Integrated Crop Management Workshops.

The workshops, offered December 9-10 at Friendship Hall in Montrose, December 11-12 at the University of Southern Colorado Student Center in Pueblo, and December 16-17 at the Colorado State University Lory Student Center in Fort Collins, are sponsored by Colorado State University Cooperative Extension. Hands-on programs will provide continuing education for consultants, managers, crop advisers, sales and technical personnel. Topics to be discussed include:

- ♦ making better variety decisions;
- ♦ predictability of variety performance;
- ♦ herbicide formulations, surfactants, and mode of action;
- ♦ reducing weed control costs;
- ♦ fertilizer selection, management and application;
- ♦ fertigation; and
- ♦ soil compaction.

Each 1.5-hour session will provide 1.5 continuing education units for Certified Crop Advisers, for a total of 12 units.

Workshop preregistration, due by November 15, is $50.00 for one day and $80.00 for two days. Late registration is an additional $10.00. Registration includes lunch and reference materials.

For additional information or to register, contact Pamela Chase, Department of Soil and Crop Sciences, Plant Sciences Building, Colorado State University, Fort Collins, CO 80523, telephone 970/491-6201, fax 970/491-2758.

Professional development funds have been obtained and registration fees will be waived for all Cooperative Extension staff attending. However, if you are interested in attending, we would still appreciate that you contact us and preregister to maintain an accurate enrollment count. ☛Shanahan

1996 NORTHEASTERN COLORADO PINTO BEAN VARIETY PERFORMANCE TRIALS

Colorado State University personnel annually evaluate commercial and public dry bean varieties at several locations in Colorado to assess yield and adaptation to Colorado growing conditions. In 1996, the trials were conducted in northeastern Colorado at Burlington, Eaton, and Yuma. Although this report only concerns pinto bean variety results, three separate market classes were tested: 1) pinto, 2) light red kidney, and 3) special (black, great northern, small white, and navy). A randomized complete block field design with four replicates was used in all trials. Test plots were planted and harvested by Colorado State University personnel with CSU

In 1996, the trials were conducted in northeastern Colorado at Burlington, Eaton, and Yuma.

equipment. The seeding rate was approximately 87,120 seeds per acre. Plots consisted of four 30-inch rows, and harvest area was approximately 200 sq.ft. All trials were situated in commercial bean fields to expose varieties to the same diseases, insects, and climatic conditions as faced by Colorado bean growers. Grain yields, in pounds per acre, were adjusted to 14% moisture content.

1996 Season Summary

This year was a full cropping season characterized by early seeding, plentiful and well-distributed rainfall, and absence of water stress. There were sufficient growing degree-days without periods of deleteriously high temperatures. There was no killing frost before harvest and full-season varieties were able to reach complete maturity in the field. Leaf rust, bacterial brown spot, common bacterial blight, and white mold were generally controlled until late in the season. The 1996 bean crop was damaged by frequent July and August hailstorms, bronzing, and by heavy late season precipitation that impeded harvest operations and may lead to lower grain quality.

Trial Conditions

Burlington: Previously in corn, planted 5/23 (obtained good plant stands despite crusting prior to emergence), fertilizer was 80 N and 40 P_2O_5/acre, herbicide was sonalan/eptam, and fungicide was tilt (1x) and champ (2x), diseases present were rust and bacterial brown spot. Eaton: Previously in corn, planted 5/16, no additional fertilizer, herbicide was dual+eptam, sulfur fungicide was flown on after hail (hailed on three times during July and August 1996 but still managed to produce good yields), rust was present late. Yuma: Previously in corn, planted 6/6, fertilizer was 50 N and 10 P_2O_5, herbicide was dual and treflan, fungicide was copper (4x), rust, bacterial brown spot, and common bacterial blight were all present in this trial. Poor plant stands in 14 plots resulted in average variety yields being based on remaining plots of each variety.

Description of Selected Pinto Bean Varieties

Apache - An early-maturing, rust resistant, large-seeded variety from Idaho Seed Bean.

Bill Z - This Colorado bean industry standard was a 1985 CSU release with resistance to bean common mosaic virus (BCMV) and tolerance to bacterial brown spot (BBS).

Chase - This 1993 U. of Nebraska release topped the 1995 bean variety trial for yield at Ovid and is resistant to rust and white mold (WM), but susceptible to fusarium wilt (FW).

RNK 179 - A Rogers Seed Co. line susceptible to rust but moderately resistant to some bacterial diseases.

USWA-19 - Soon to be a USDA-ARS (Prosser, WA) release resulting from a cross of 'Othello'/'Sierra' with rust, BCMV, and Curly Top Virus resistance as well as strong tolerance to the root rot complex. varies in maturity from the same as 'Othello' to 5-7 days later and is larger-seeded than 'Othello'.

USWA-20 - Soon to be a USDA-ARS (Prosser, WA) release from a cross of 'Othello'/'Sierra' that is both large-seeded and high yielding with broad spectrum resistance to Fusarium Yellows root rot disease. It has later maturity than both 'Othello' and USWA-19.

Vision - An upright variety resistant to rust from Asgrow Seed Co. Under 1996 Colorado conditions it matured late but was resistant to rust.

1996 Pinto Bean Variety Performance.

	Location					
	Burlington	Eaton	Yuma	Averages		
Variety*	Yield	Yield	Yield	Yield	Moisture	Seeds
		lb/ac		lb/ac	%	#/lb
USWA-19	2670	2010	2261	2314	13.1	1234
USWA-20	2663	2213	1959	2278	14.1	1260
RNK 179	2323	2332	2142	2266	14.5	1277
Vision	2658	2279	1799	2245	15.8	1288
Bill Z	2088	2080	2107	2092	13.2	1373
Chase	2183	1850	2203	2079	14.0	1355
FX930101**	1850	2235	—	2043	12.9	1274
Olathe	1986	1996	2103	2028	14.5	1322
Maverick	2158	1786	2114	2019	15.1	1341
GTS-900	2360	1871	1711	1981	13.9	1324
CO49137**	—	2186	1749	1968	14.8	1367
CO49144**	—	2230	1700	1965	16.7	1486
NE94-4	2112	1875	1902	1963	15.0	1441
Apache	1596	1742	2383	1907	14.2	1303
UI 114	1721	2039	1716	1825	14.4	1328
95YT122***	—	—	1816	1816	18.0	1418
Hatton	1822	1715	1712	1750	15.1	1265
RNK 178**	1797	—	1628	1713	15.4	1424
Averages	2132	2028	1944	2030	14.5	1330

*Varieties ranked by the average yield over three locations in 1996.
**Planted at one location. ***Planted at two locations.

ACKNOWLEDGMENTS

Bean variety trials are made possible due to funding from the **Colorado Dry Bean Administrative Committee** and the generous contribution of equipment, time, and land made by three Colorado bean producers who hosted these trials, without recompense, on their farms: Steve Scott (Burlington), Chuck Winter (Eaton), and Troy Newton (Yuma).

The Colorado State University Dry Bean Improvement Team
Crops Testing (Dept. Soil and Crop Sciences): Jerry J. Johnson, Extension Crop Production Specialist; John F. Shanahan, Extension Crop Specialist; James P. Hain, Research Associate; Cynthia L. Johnson, Research Associate; Mark Weimer, Research Associate.
Plant Breeding: Mark A. Brick, Plant Breeder, and J. Barry Ogg, Research Associate, Soil and Crop Sciences; Calvin H. Pearson, Western Slope-Fruita; Abdel Berrada, Southwestern Research Center; Frank C. Schweissing, Superintendent, Arkansas Valley Research Center.
Pest Management (Dept of Bioagricultural Sciences and Pest Management): Howard F. Schwartz, Extension Plant Pathologist; Scott Nissen, Extension Weed Scientist; Frank Peairs, Extension Entomologist; Stan Pilcher, Extension Entomologist, Washington County.
☛JJohnson

Several new (and old) oilseed crops may soon be making their way into Colorado.

NEW OILSEED CROPS UNDER DEVELOPMENT

Several new (and old) oilseed crops may soon be making their way into Colorado. These are receiving interest because of their unique fatty acid profiles. You may not remember biochemistry all that well, but oil is typically stored in plant cells as triglycerides (three fatty acids linked to glycerin). These fatty acids are characterized as saturated, monounsaturated and polyunsaturated. If we look at a market for

edible vegetable oil, we typically look for a monounsaturated fat with an 18 carbon chain called oleic acid. Canola and sunflower oils are rich in monounsaturated fats. Longer chain fatty acids, such as 22 carbon chain erucic acid are typically used in everything from plastics to transmission fluids. Short-chain fatty acids, such as 12 carbon lauric acid, are used primarily in cosmetics (soaps and shampoos).

The development of genetically-engineered rapeseed to produce lauric acid (the primary ingredient in coconut oil) has been allowed for production in Colorado.

New variations in these basic fatty acids are leading to a growing interest in industrial oils from oilseeds. A variation of oleic fatty acid found in castor, called rincoleic acid, is a source of hydroxy fatty acids used in the manufacture of lubricants, plastics, pharmaceuticals and other applications for high viscosity oils. Castor has contained a severe allergen, ricin, and has been a tall crop unsuitable for mechanical harvest, making castor production a bit hazardous. New castor lines out of Texas with very reduced ricin content and a semidwarf growth habit may revive this crop for U.S. production. Seed of this new semidwarf is available to plant 100,000 acres. A competitor for the hydroxy fatty acid market is lesquerella. While lesquerella is still in development, a species called "grandiflora" appears to be adaptable to Colorado. Our native lesquerella can be found from the Eastern Plains to the Western Deserts and the plants are generally about 12 to 18 inches tall. The oil from lesquerella has 22 carbons and is superior to castor oil in high temperature conditions. Another variation on the hydroxy fatty acid theme is from meadowfoam. Meadowfoam is native to the coastal areas of Northern California and Oregon. It grows in marshy areas and is currently being looked at to replace grass seed production areas along the coast. In Colorado, we would look at it as a crop for mountain meadows. It produces eicosenoic and docosanoic acids (20 and 22 carbons long) which are dihydroxy fatty acids. These oils can be converted to things called lactones, which have very high commercial value in increasing oil viscosity and in plastics manufacture.

Some plants can accumulate large quantities of Se and can be potentially toxic to livestock.

Current market values for these oils (wholesale) are: castor oil, $0.45/lb; lesquerella oil, $0.90/lb; meadowfoam oil $7.00/lb.

New types of canolas and rapeseeds will also be soon appearing. Initial 1996 tests of high erucic (22 carbon, monounsaturated) spring rapeseed and mustards show promise in dryland and irrigated trials (1,120 lbs/a dryland; 2,225 lbs/a irrigated). The development of genetically-engineered rapeseed to produce lauric acid (the primary ingredient in coconut oil) has been allowed for production in Colorado. Additional new types, including a rapeseed carrying the genetics for meadowfoam oil, are on the way. We at CSU are working to transfer the genes for lesquerellic acid from lesquerella to canola. The prices paid for these modified oils have not been set, but its a pretty fair guess that it will exceed the current market value for canola oil ($0.25/lb) and rapeseed oil ($0.35/lb). ☛DJohnson

SELENIUM

Selenium is a naturally occurring element in the environment. It is an important mineral for animals and humans, but it can be toxic at elevated levels. Selenium is very similar to sulfur and phosphorus in its chemistry. It is often associated with sulfur in compounds such as selenium sulfide (Se_2S_2) and polysulfides. Selenate (SeO_4^{-2}) and selenite (SeO_3^{-2}) compete with sulfate (SO_4^{-2}) for uptake by plants and are common ions in natural waters and soils. Selenium uptake by plants can be suppressed in soils high in sulfate, such as in gypsiferous soils. Soils usually contain an average of 0.1 to 2ppm total selenium. Total Se, however, is a poor indicator of what is actually available to plants. A better indication of phyto-availability is the water soluble content of Se in the soil, which can range from 0.2 to 2 parts per billion in areas where Se is deficient to 5 ppb to 4.0 ppm in areas where Se is more elevated.

Some plants can accumulate large quantities of Se and can be potentially toxic to livestock. Milkvetchs (*Astragalus*), woody aster (*Xylorrhiya*), princess plume (*Stanleya*), and mustard (*Brassica*) can potentially accumulate 1,000 to 10,000 ppm Se. Other plants that can accumulate several hundred ppm Se include aster (*Aster*), saltbush (*Atriplex*), paint-brush (*Castilleja*), gum-plant (*Grindelia*), and matchweed (*Gutierrezia*). Most grains and

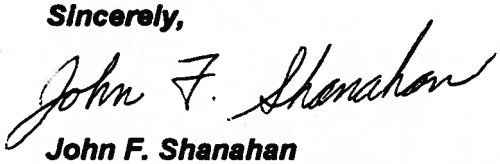
grasses normally do not accumulate more than 50 ppb Se even in areas where Se may be high.

Soils and plants can be analyzed for total selenium using a nitric-perchloric acid digest or a nitric perchloric-hydrofluoric acid digest. The resulting digests can be analyzed for selenium using hydride generation inductively-coupled plasma (ICP) or atomic absorption (AA). Available Se in the soil can be extracted with hot water or ammonium bicarbonate-DTPA. The extracts are then analyzed for Se using hydride generation ICP or AA. An upper limit of 0.1 ppm extractable Se in the soil and 5 ppm in plants has been established as being potentially toxic. The upper limit for Se in drinking water has been set at 0.01 ppm.

In general, most Colorado soils do not contain toxic levels of Se, however, mining activities can create areas where Se may be high.

Although selenium has been considered a toxic element at elevated concentrations, it is an element that is required by animals and humans. In general, most Colorado soils do not contain toxic levels of Se, however, mining activities can create areas where Se may be high. A soil test can easily determine whether or not a site is contaminated with Se. ☛Self

Sincerely,



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