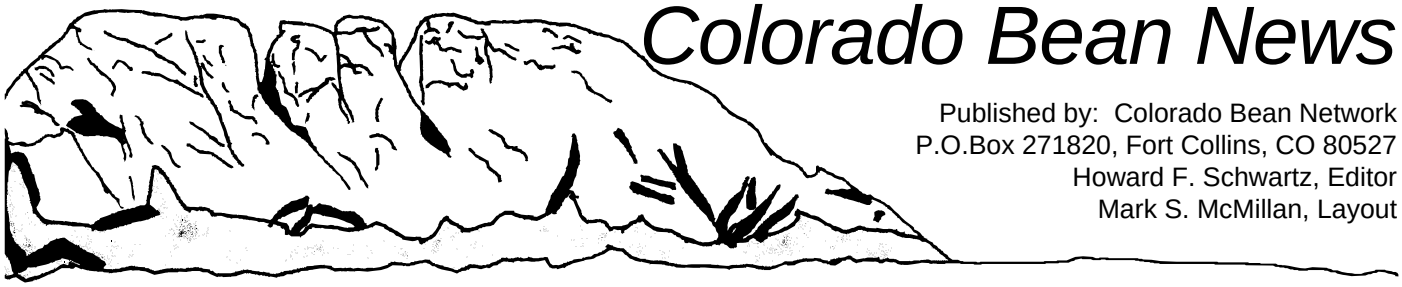

Colorado Bean News

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Mark S. McMillan, Layout

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SAFETY BY DESIGN

By Howard J. Doss, Michigan State University
Reprinted from Michigan Dry Bean Digest, Spring 1996

Every Farm Needs a Safety Program

It's unlikely that you would undertake any job without at least some advance planning. Whether planting a crop, harvesting fruit, or doing routine barn chores, you will certainly have given thought to such factors as materials and equipment needed, time requirements, etc. Workplace safety should also be considered before undertaking any task. Ideally, concern for safety should become habitual among all farm workers.

The impetus for increased safety awareness must come from the farm owner/manager. The best way to achieve your accident prevention goals is to develop a safety program tailored to the needs of your operation. Once the rules have been set, management has to work diligently to see that they are enforced, and to foster positive attitudes about safety in the entire workforce.

Right now is an ideal time to start work on a safety program for your farming business. It could very well prevent devastating injury or fatality. Studies have shown that accident prevention measures pay significant economic dividends, in terms of reduced downtime and less damage to equipment and facilities. Chances are that you'll notice improvements in productivity and efficiency as a result of instituting a safety program.

Safety Policy Demonstrates Commitment

A policy statement by management is an effective way to communicate a farm business's commitment to worker health and safety. A clear line of responsibility for correcting hazards and dealing with other safety concerns can enhance working relationships between all who work on the farm.

The farm operator who may also be an employer should prepare a written agricultural safety policy with a way to upgrade and review it each year. A policy sets the attitude and a farm safety plan determines actions and responsibilities.

Work Safety Rules

Safety rules including conditions of employment for your operation establish safe work practices for everyone. Remember that rules are less likely to be effective if the list is excessively long. Also include these items in your operations safety plan:

* Training must be timely and thorough
* Establish a safety committee
* Develop a workplace inspection routine
* Document your activities
* Post policy and work rules at a central notification location on farm "bulletin board"

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CSU AG LEADER UPDATE

In early May, it was announced by Dr. Kirvin Knox that Charles Laughlin, Director of the CSU Agricultural Experiment Station, was leaving Colorado State University to accept a position as dean of the College of Tropical Agriculture and Human Resources at the University of Hawaii effective July 1, 1996. Chuck has served as director of AES for almost four years. His leadership, unbridled enthusiasm, and energy have been enormous assets to Colorado State University, particularly in focusing the AES agenda and addressing critical issues facing the outstate research centers. But Chuck has been more than the AES director, he has contributed his many talents across campus. His activities in leadership development have brought us new experiences and insights, and we have all benefited from his commitment to agriculture and the broader university.

Chuck Laughlin shares the following comments with his friends and colleagues: "First, thank you to each of you for contributing to four exciting and rewarding years. Colorado State University has a great faculty, staff and student community, which I am proud to have been privileged to be a part. It is with very mixed emotions that I leave Colorado State and accept these new challenges. However, as one friend said, 'if you don't feel sadness about leaving you haven't given much of yourself to Colorado'. Your openness, 'can do', 'you bet' Colorado approach to life has helped shape my leadership for the Agricultural Experiment Station. These are qualities I hope to transfer to the challenges facing Hawaiian agriculture. The willingness of Colorado ranchers, farmers, agribusiness, and agricultural organizations to provide constructive suggestions and needed assistance has helped to strengthen the research program at Colorado State. These vital connections are what make Colorado agriculture great.

[Note: Dr. Lee Sommers, Head of the Dept. of Soil & Crop Sciences, has been named as the interim director of AES until a national search can be completed.]

Continued on page 4

Bravo ISK-Biotech

1pg B/W

Continued from page 2

COOPERATIVE EXTENSION GUIDELINES

CSU Director Milan Rewerts Fort Collins, CO

Cooperative Extension is a unique organization. The following "guiding principles" reflect that uniqueness, and are critical to our organization as we fulfill our mission.

Cooperative Extension:

* is educationally-focused, mission-driven, and results-oriented.
* provides information that can be trusted.
* uses research-based information to help people solve problems.
* is needs/issues-based and focuses on Colorado problems and issues in the broad program areas of agricul ture and natural resources; consumer, family, and health; and 4-H youth development, in an interdisciplinary and collaborative way.
* applies technology to support educational efforts.
* is a close connection to local problems and issues; is customer-driven based on issues, not based on depart ments to program areas.
* believes diversity is a strength.
* is a county-state-federal partnership where Colorado State University is the managing partner.
* has a county presence and will maintain a presence in every county that wants to continue partnering with the University.
* is efficient in its administration at all levels, with minimal levels and layers.
* is connected to, and an integral part of, the land-grant university.
* has the ability to reach into, and across, the University for resources to address Colorado problems and issues.

Cooperative Extension has a proud history. We also have important challenges facing before us. These principles will guide us in accomplishing our mission on behalf of Coloradans.

Beans for a Change of...

AG OPEN HOUSE

FOCUS ON COOPERATIVE EXTENSION

Where: CSU Agricultural Research, Development & Education Center

4616 N.E. Frontage Rd., Ft Collins, CO 80524
For more information, contact Jennifer at
970-491-5271 or 491-2439

We are on the East side of I 25, north of the Budweiser plant. From Ft Collins I-25 N, exit 271, right at STOP, then 1st left onto NE Frontage Rd go approx. 3 miles. We are the beige buildings with green roofs. We are also approx. 3 miles South of Wellington (exit 278).

When: Wednesday July 17, 1996 3:00pm to 7:00pm (or later)

We supply the PICNIC!
Enjoy a horse and wagon HAYRIDE tour of the farm.
Talk with COOPERATIVE EXTENSION SPECIALISTS.
Visit with FIELD RESEARCH PERSONNEL.

COME AND FIND OUT WHAT IS HAPPENING IN AGRICULTURE!
Informative presentations by Cooperative Extension Specialists & Field Researchers.

Plus DEMONSTRATIONS on:

The Latest Technology.
Such as The GPS - Global Positioning System & Applications

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Such as COAGMET for Improved Crop & Pest Management Decisions

Developing New Products Made From Low Demand Crops.
Such as: Engine Oil made from Canola Seed.
(smells like baking cookies when engine is run)

Improving Crop Yields via Genetics.
Such as: Russian Wheat Aphid Resistant Wheat.

New Farming Methods.
Such as: Ridge Till

Ways To Make Irrigating Easier.
Such as: Using A Computer To Irrigate

Water Conservation and Irrigation.
Such As: Polyacrylamide - Reduces Amount of Water Needed For Irrigation.

Educational Displays
Such As: A “Living Museum”

AND MUCH MORE!

CDBAC UPDATE

The Colorado Dry Bean Administrative Committee shared the following 1995 - 1996 budget update at its recent meeting at the Colorado Department of Agriculture in Lakewood.

Budget Item	*Budgeted Total*	*Total Spent*	*Amount Remaining*
Promotional	35,000	18,439	16,561
Administrative	26,000	22,737	3,263
CSU/CBN	40,000	21,500	18,500
Checkoff Refunds	2,500	925	1,575
Meetings & Travel	22,000	10,498	11,502
Legal & Audit	1,100	1,000	100
Newsletter	8,000	4,000	4,000
Nat. Dry Bean Council	30,000	30,000	0
Total	164,600	109,099	55,501
Checkoff Dollars Received:			
1994 or earlier crop	26,198		
1995 Crop	87,058		

CDBAC Assessment Report (x 000 cwt) - 5/15/96

*Market Class**	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*Ave cwt*
Pinto	3,785	4,285	2,343	2,343	2,345	1,287	2,396,800
LRK	16	42	71	63	122	123	72,800
Anasazi	1	1	3	4	4	5	6,000
Black	0	1	16	17	6	4	7,300
Great Northern	5	2	30	1	3	29	11,600
Navy	25	13	3	13	2	7	10,500
Pink	1	2	1	5	1	1	1,800
Small Red	1	2	8	1	0	1	2,100
Total	3,627	2,548	2,475	2,477	2,483	1,457	2,506,100

* Does not include certified seed beans nor fees on beans not sold since 1990

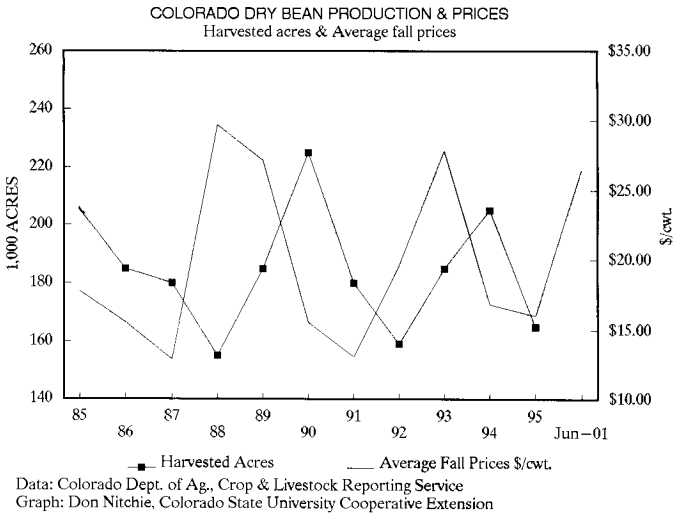
Agtrol
1 page
4 color

BEAN PRODUCTION NOTES

By Don Nitchie, Akron CSU Golden Plains Area Director

In 1995, the second highest yields on record helped to produce 31 million cwt of dry edible beans. This was 7 % above 1994 production, and 42 % above 1993. Strong production came in spite of late crop development in the early season, and hard freezes that hit Mountain and Plains states in September, killing vines in many fields. Yields in many of these states were not as high as anticipated, but heavy crops were produced in Michigan (up 48 % from 1994). Michigan, North Dakota, and Nebraska combined to account for 57 % of U. S. production. Consequently, significant increases in navy, great northern, and black bean production were realized, as North Dakota, Michigan and Nebraska are major producers of these varieties. Several California-dominated varieties, such as garbanzo and blackeyes, also registered notable increases, as overall California dry bean production was up 7 % from 1994.

Total dry edible bean exports rose for the third consecutive year to 840.3 million pounds in 1995. This was up 4 % from 1994 and 18 % from 1993. Pinto beans were again the largest class of dry bean exported, with 64 % going to African countries largely through Food for Peace programs. Navy beans were the second largest class of dry beans exported, with 60 % going to the United Kingdom. Garbanzo and black beans realized the largest percentage growth in exports, increasing 166 and 84 %, respectively, from 1994. Colombia and Spain were the largest importers of U. S. garbanzo beans, while Mexico, Venezuela and Brazil were the leading foreign markets for U. S. black beans.



Data: Colorado Dept. of Ag., Crop & Livestock Reporting Service
Graph: Don Nitchie, Colorado State University Cooperative Extension

PASTA FROM BEANS

W. C. Sung[1], M. Stone[1], and D. L. Johnson[2] - [1]Dept. of Food Science & Human Nutrition,and [2]Dept. of Soil & Crop Sciences - Colorado State University

Starch was isolated from legumes and processed into noodles using 95 % extracted starch mixed with 5 % gelatinized starch. Starch slurries were extruded into a hot water bath (90 - 95 C) and held for 10 to 20 seconds. Noodles were cooled in cold water and frozen at - 10 C for 24 hours. After thawing in cool water for 2 hours, noodles were air-dried in a 40 C oven, packaged, and stored in a desiccator.

Mung beans, pinto beans, peanuts, and chickpeas were used as the sources of starch for the noodles. Various proportions of these starches were used with mung bean starch and evaluated in comparison to mung bean starch noodles. Based on the physical characteristics of starches (granule size, gelatinization temperature range, iodine affinity, and gel strength), mung bean starch and chickpea starch were chosen for noodle quality evaluation.

Based on solid losses during cooking, instrumental texture and sensory evaluation, mung bean and chickpea starches produced starch noodles of acceptable quality. Addition of surfactants (monoglyceride and sodium stearoyl lactylate) did not improve the noodle eating quality and increased the solid loss of starch noodles during cooking.

Continued on page 9

BEANCOFT 1996

Jerry Johnson, CSU Bean Variety Testing Fort Collins, CO

Colorado and Nebraska are jointly conducting collaborative on-farm tests (BEANCOFT) of new and promising pinto bean varieties. BEANCOFT entries include ROG 179 (Roger Bros.), Apache (Idaho Seed Bean) and Vision (Asgrow), as well as high-yielding check varieties Bill Z (Colorado State University release) and Chase (Univ. of Nebraska release). Support for BEANCOFT from the dry bean industry has been great on both sides of the border, including donations of seed from the seed companies. The BEANCOFT program has been made possible due to close cooperation among the University of Nebraska researchers (Dave Nuland and Jim Schild) and Colorado State University personnel (Jerry Johnson, Mark Brick, Howard Schwartz).

CSU Cooperative Extension agents Ron Meyer, Bruce Bosley, Jerry Alldredge, Jim Zizz and Gary Lancaster worked hard to find bean producers willing to host BEANCOFTS on their farms. Bean industry cooperators included Jerry Haynes - Jacks Bean at Holyoke, Bill Newth - Trinidad Bean at Sterling, Ernie Gray - Western Int. at Burlington among others. They provided 50 pounds of seed of each variety to each of 7 Colorado dry bean producers to seed in drill strips. Each of the 9 plot sites will be visited in late July and early August, and again prior to harvest. We will hand-harvest 80 foot of row from each variety to estimate yield, in addition to grower estimates of strip yields.

The 7 cooperators (Extension Contact) are as follows:

Kit Carson County - Steve Scott (Ron Meyer)
Sedgwick County - three plots with Rod Renquist (Gary Lancaster)
Phillips County - Jim Lenz & Dallas Shafer (Jim Zizz)
Morgan County - Steve Bruntz (Bruce Bosley)
Weld County - Leonard Ditter & Mark Spaier (Jerry Alldredge)

Characteristics to look for in the new entries include:

ROG 179	Vigorous plant type with yield potential; susceptible to some races of rust in the region.
Apache	Rust resistant with good seed quality. Apache is basically Fiesta with rust resistance.
Vision	Rust resistant; this is Asgrow's first pinto release.
Bill Z	High yielding check, now susceptible to many races of rust in the region.
Chase	A new high yielding pinto with multiple disease resistance, including rust and white mold.

Continued from page 8

Starch Noodles	% of Solid Loss*
100 % Mung Bean	3.93 ± 0.16
100 % Pinto Bean	5.42 ± 0.31
100 % Chickpea	5.91 ± 0.04
100 % Wheat Starch Pasta	100.00 ± 0.00
100 % Durum Wheat Starch Pasta	49.42 ± 3.42
100 % All-Purpose Wheat Pasta	22.65 ± 2.59
100 % Durum Wheat Pasta	9.60 ± 1.10

* Note: > 10 % is considered acceptable

BEAN RECIPES

Tropical Baked Beans by Lynne Bigwood, Northarvest Home Economist Reprinted from Northarvest Bean Grower, Summer 1996 Issue

Tropical Baked Beans uses the relatively new orange flavored prunes. Cut the prunes up with a kitchen scissor. Leftover prunes make a tasty, nutritious snack. Mango chutney is found in the supermarket condiment and sauces section. The original recipe called for 1/2 cup of mango chutney, a 9-ounce bottle is 3/4 cup. It is expensive and an essential flavor, so I added the rest of the bottle. If you make your own chutney, use homemade. Red pepper flakes were specified, I found the new mild Tabasco green jalapeno pepper sauce and used it. Jicama or "Mexican potato" is found in the specialty fresh foods section. It remains crisp even when cooked and baked. Shred any leftover jicama, combine with cabbage, etc. and use in a coleslaw. Yield is 8 main dish servings or 16 side dish servings.

Ingredients:

8	oz	Italian sausage (in casing, slice thin, bulk crumble)
1.5	cup	small or medium jicama (1/2 inch cubes)
1	can	15.25 ounces tropical fruit salad with liquid
1	can	15 ounces red beans, drained, rinsed
1	can	15 ounces black beans, drained, rinsed
1	can	15 ounces navy beans, drained, rinsed
1	can	14 ounces diced tomatoes with liquid
1/2	cup	coarsely chopped orange essence pitted prunes
1	jar	9 ounce mango chutney
3	T	cider vinegar
1.5	t	whole cumin
1/2	t	ground allspice
1/2	t	mild jalapeno pepper sauce

Cook sausage in skillet over medium heat until browned; drain thoroughly on paper towels. Discard all but 1 teaspoon of fat. Peel jicama, cut into cubes. Add to skillet and saute 5 minutes. Mix all ingredients in a 3 or 4 quart casserole or pot. Cover and bake at 350 F for 1 - 2 hours.

Jalapeno Bean Cornbread Bake
by Bina Schwartz, Oskosh, Nebraska
Reprinted from The Bean Bag, Spring 1996 Issue

1	lb	hamburger
1	can	16 ounces pinto beans, drained, rinsed
1	can	nacho jalapeno cheese sauce
1	box	Jiffy cornbread

Brown meat and drain. Add pinto beans and heat through. Pour into 9 x 13 inch pan. Spoon cheese sauce over meat mixture. Mix cornbread according to package directions and spread over entire meat mixture. Bake at 350 F for 35 minutes. Serve with a salad to make a complete meal.

New Herbicide for Post-Emergence Grass Control in Dry Beans

Scott Nissen Extension Weed Specialist

Du Pont has recently been granted a full federal label for use of Assure II herbicide in dry beans. Assure II is similar in mode of action and chemical structure to other post- emergence grass herbicides such as Fusilade®. Assure II has the same mode of action, but is different in chemical structure from Poast®.

In university field trials, Assure II has provided good to excellent control of volunteer grain, various foxtail species, field sandbur and barnyardgrass. Assure II moves readily in grasses and accumulates in areas of rapid growth; therefore, it will provide control of perennial grass species such as quackgrass. The typical use rate will be 8 oz. of product/ac for annual grass control; however, perennial grass control will require higher rates. The addition of crop oil concentrate or nonionic surfactant to the spray solution is required with crop oil concentrate being the preferred adjuvant under Colorado conditions.

The label will allow Assure II to be tank mixed with Basagran® if the recommended rate of Assure II is increased by 2 oz/ac. Like other post-emergence grass herbicides, Assure II activity will be significantly reduced if it is tank mixed with broadleaf herbicides other than Basagran. Growers wishing to use Assure II herbicide should consult the supplemental label for dry beans before making any herbicide application.

Remember that all post-emergence grass herbicides have very similar modes of action and total reliance on these herbicides for grass control can lead to the development of herbicide resistant weed species. Growers are encouraged to use crop rotations, mechanical weed control, and herbicides with different modes of action in order to minimize the risk of selecting for herbicide resistant weed species.

AG FACTS

Reprinted from Jacks Bean Talk, Vol. 7 Issue 2

* Each year 1 American farmer provides food and fiber for 129 people - 97 in the U. S. and 32 abroad.

* American agriculture employs 21 million people or 18.5 % of the labor force in:

wholesaling and retailing	- 50 %
farm production	- 20 %
marketing and processing	- 15 %
agribusiness	- 12 %
farm supplying	- 3 %

* The U. S. has less than 7 % of the world's land, but produces 13 % of the world's farm commodities.

* Americans spend 11.4 % of their personal income on food, compared with:

Japan	- 21 %
Italy	- 26 %
Greece	- 42 %
China	- 53 %

* There are more than 150,000 U. S. supermarkets, and they offer over 26,430 different foods.

BEAN RUST THREAT

H. F. Schwartz & Mark S. McMillan Colorado State University, Fort Collins

Many of the pinto and great northern varieties planted during 1996 in Nebraska and Colorado are susceptible to strains of rust collected from the region during recent years. Exceptions include the new Nebraska release pinto Chase, Apache, Vision and light red kidney varieties. Rust reactions of other market classes such as navy, small white and black should be closely monitored during 1996 and may require fungicide protection.

Knowing that rust may be a problem in 1996, what are your options?

The initial appearance of rust on the High Plains occurs on volunteer beans in late May to early June, and on new crop beans in mid to late July. Spread from these initial infection points to other plants and fields then occurs by local wind currents that physically transport the spores. The rate and extent of secondary spread are dependent upon the volume of spores present, varietal susceptibility, and weather conditions in the region. A 5-stage CSU disease risk model incorporates information on the previous season's rust pressure and evidence of rust overwintering (volunteer bean infection), varietal susceptibility, rainfall and temperature conditions during volunteer bean plant emergence, rainfall and temperature conditions during new crop bean growth, and stage of plant development when initial infection occurs.

Sanitation and destruction of volunteer bean seed and plants in the fall after harvest and in early spring before emergence of new crop beans is vital, and effectively reduces risk of early-season disease. In Colorado (and in western Nebraska in 1995), researchers observed the highest incidence of rust and bacterial diseases on volunteer bean plants growing within winter wheat fields that were minimum-till planted onto old bean ground. Therefore, disease control starts with incorporation of bean debris into the soil in early spring and practicing early season weed control in rotation crops such as winter wheat, corn and sugarbeets to kill volunteer beans and prevent rust and bacterial diseases such as bacterial brown spot from spreading into the new bean crop. This practice will break the cycle of infection from last fall's contaminated debris to this spring's volunteers, and then to new crop bean plants.

One to three timely sprays of a protectant fungicide such as chlorothalonil (e.g. Bravo 720 - 14 day pre-harvest interval) or maneb (e.g. Manex, Maneb 75DF - 30 day pre-harvest interval) have provided effective and economical returns to growers when moderate to severe rust pressure threatens susceptible varieties up until 21 days before knifing. Rust protection and crop response were improved when multiple sprays of Bravo were applied on a 7 - 10 day schedule during the critical plant development stages of flowering and pod set/fill. Infection was reduced by 38 - 78%, yield was increased by 65 - 187%, seed size was increased by 6 - 12%, and net returns of $ 37 - 65/acre were recorded for $ 15/cwt beans during 1991 to 1994 in research plots and commercial pinto bean fields in Colorado. A systemic fungicide, propiconazole (e.g. Tilt - 28 day pre-harvest interval), may be labeled for use in this region during 1996; check with local chemical suppliers on registration status and availability.

Be proactive and plan now for a rust control program that can be used if it is needed during 1996. Work with your consultant, bean elevator personnel, chemical supplier and university faculty to design an integrated pest management program that can be implemented to reduce disease pressure (by crop rotation, sanitation, varietal choice) and apply

See Bean Rust Threat - page 13

Bacterial Diseases

Excerpts from Regional Bean Publication Colorado State University, U. of Nebraska, U. of Wyoming

A complex of bacterial pathogens and their diseases affect bean productivity. Each is favored by high moisture situations and factors such as storms, equipment, and irrigation water which move the pathogens within and between fields. Varying daily temperature conditions favor each disease: halo blight - less than 80 F; bacterial brown spot - less than 85 F; common bacterial blight and bacterial wilt greater than 80 F.

Problem - Halo Blight

The first symptoms of infection are small water soaked sp ots on the leaflets. In a dry climate, this infected tissue die s and is tan-colored. A broad yellow-green halo develops around the spots. This broad halo helps distinguish halo blight from common bacterial blight which exhibits a narrow, lemon-yellow border around leaf lesions. Presence of the halo is absent under high temperatures. Systemic infection causes younger leaflets to curve and exhibit considerable yellowing on these leaves with no dead spots or distinct halos. Halo blight symptoms on pods begin as water soaked circular spots or water-soaked streaks on the pod suture. The bacterial ooze in the center of the spots appears light cream or silver colored. Early pod infection causes shriveled seeds. Stem girdling and joint rot occur above the cotyledonary node of plants grown from infected seed.

Problem - Bacterial Brown Spot

Lesion size varies, but are usually small and brown, surrounded by a narrow yellow zone. Water soaked tissue may not be noticeable, but if present appear as small circular spots on the lower leaf surface. The centers of old lesions fall out, leaving tattered strips or holes on affected leaves. If the disease becomes systemic in the plant, lesions can occur along the stem. Pods from infected plants are bent or twisted with visual ring spots. Water-soaked brown lesions can form on pods. Older plants and plant parts are more resistant to infection.

Problem - Common Bacterial Blight

Small water soaked spots on the underside of leaflets are the first symptoms. These spots enlarge and merge, becoming dried and brown. A narrow, bright lemon-yellow border of tissue encircles the lesion. Infected pods develop circular water soaked spots, and yellow masses of bacteria may appear at their center. Later, the spots dry and become reddish-brown sunken lesions. Early pod infection causes shriveled seeds, and the bacteria may cause yellowing under the seed coat of infected seeds. A stem girdling or joint rot occurs above the cotyledonary node of plants grown from infected seeds.

Continued on page 14

Bean Rust Threat from - page 12

appropriate fungicides at labeled rates and schedules if rust becomes a threat.
Rust advisories will also be available from these sources and DTN/FarmDayta (Colorado Information pages) during the 1996 season to keep you informed on the development of rust and other disease outbreaks in the region. This network is jointly sponsored by the Colorado Dry Bean Administrative Committee and the Nebraska Dry Bean Commission.

A proactive and aggressive integrated pest management strategy can help you produce an economical and high quality crop of beans, even if the variety is susceptible to rust.

Continued from page 13

Problem - Bacterial Wilt

This seed-borne pathogen attacks young seedlings and kills them by plugging the water conducting tissue (vascular bundles). Larger plants that become infected may survive the entire season and produce seed. Leaves of older infected plants will wilt, especially during moisture stress and the warmer parts of the day. Golden brown, irregularly shaped leaf lesions occur, and affected leaves may drop off. Infection can occur on pod sutures similar to that caused by common and halo blights, but it seldom causes circular water soaked spots. The bacteria may cause a bright yellow, orange, or purple color under the seed coat, depending on the strain of wilt organism present.

Factors Favoring Bacterial Diseases

Planting infected seed, or clean seed in the presence of infested debris in the area enhances early infection and disease spread. Cool (halo blight, bacterial brown spot) to warm (common bacterial blight, bacterial wilt) weather favors each bacterial disease and the complex of diseases. Wet weather, hail and violent rainstorms enable the pathogens to be spread rapidly within and between fields. Movement of workers or machinery through the field when bean plants are wet also enhances spread of bacteria. Bacterial wilt bacteria are spread during cultivation and root pruning. Continuous cropping to beans favors survival of the pathogen in debris.

Bacterial Disease Management

1. Plant certified seed of resistant or tolerant varieties.
2. Plant streptomycin treated seed to help reduce seed coat surface contamination.
3. Incorporate infected bean debris into the soil after harvest, and rotate beans with other crops for at least two years. Eliminate volunteer beans the following season.
4. Stay out of bean fields when plants are wet, and minimize root pruning of plants in late vegetative stages.
5. Do not spread old bean straw on fields to be planted to beans.
6. Avoid reuse of irrigation water.
7. Consider timely preventive sprays of bactericides such as copper during to mid-vegetative and early flowering stages to reduce spread of bacteria to leaves and pods, depending upon disease pressure and climatic conditions. Follow label recommendations and a 7 - 10 day interval if disease pressure is moderate to high and a 10 - 14 day interval if disease pressure is low to moderate. Copper sprays are not reported to be beneficial for bacterial wilt management. The following coppers are examples of products labeled for management of the other bacterial pathogens and their diseases: Champ, Kocide, Cuproxate, Blueshield, Nordox, Tenn Copp, Copper Count N.

White Mold

Excerpts from Regional Bean Publication Colorado State University, U. of Nebraska, U. of Wyoming

Problem - White Mold

White mold initially appears on plants after flowering as water soaked spots on infected leaves, stems, branches, and pods. These areas enlarge into a watery rotten mass of tissue that becomes covered by a white fungal growth. Stem infection causes the
part of the plant above the point of infection to wilt and die . Affected stems appear bleached and dry which differs fr om the tan color characteristic of mature, dry plant tissue. Hard, black, irregularly-shaped resting structures (sclerotia) of the fungus form on and within the infected plant parts. Sclerotia which fall to the soil during harvest, germinate under a moist, closed canopy the following season as small (1/4 inch) beige-colored mushroom-like structures (apothecia) which release spores that are spread to dead blossoms or leaves. These spores germinate on and utilize this dead tissue as an energy source prior to the fungus invading healthy tissue.

Factors Favoring

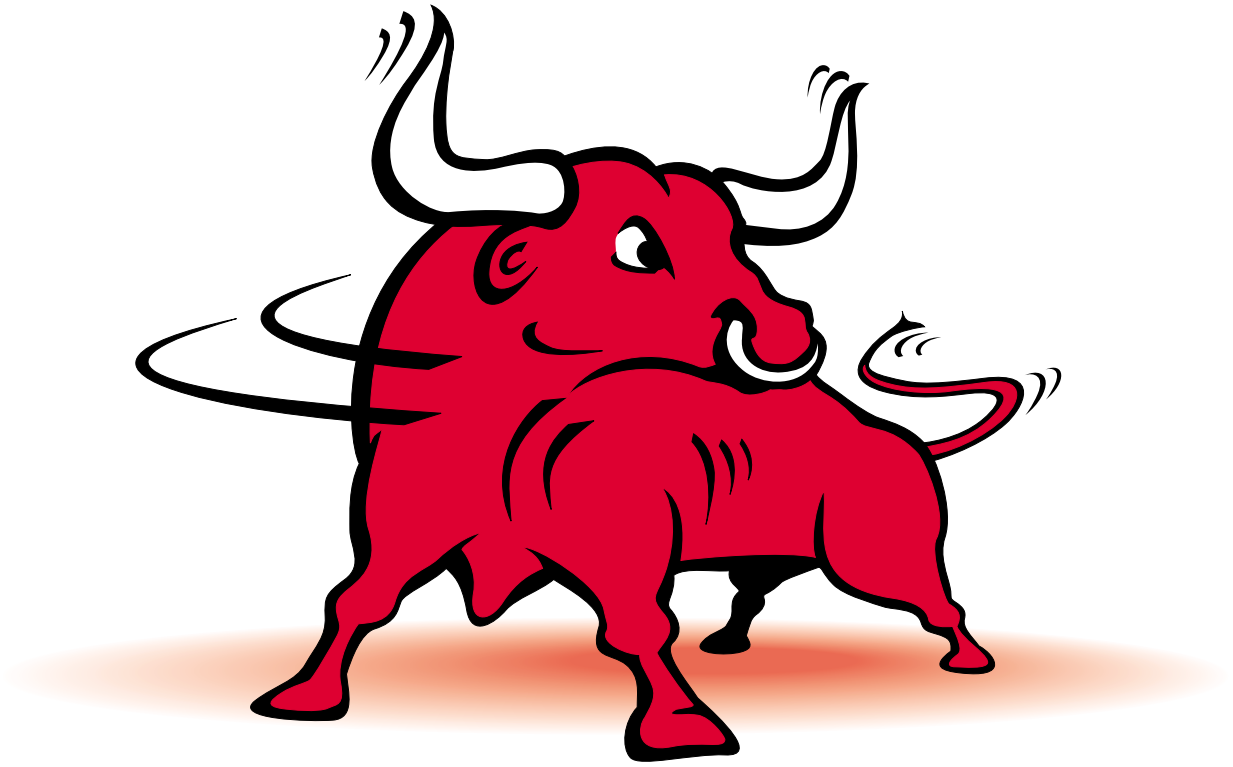
White mold development is influenced by prevailing weather conditions and certain cultural practices. High plant populations, narrow row widths, vigorously vining varieties, excess fertilizer, and abundant irrigation/rainfall all favor the development of white mold. High humidity and a wet plant canopy and/or soil surface are necessary for the fungus to spread. The disease may cause serious yield losses during wet, cool periods near the end of the growing season and even when the beans are in the windrow. Repeated cropping of susceptible crops, especially sunflowers, increases the level of sclerotial contamination within a field. Irrigation runoff water transports sclerotia and spores within and between fields. White mold infection is often localized initially within the low-lying and more poorly-drained areas of a field. Sclerotia can contaminate seed and introduce the pathogen into new fields.

Management

1. Rotate for at least three years to non-host crops such as sugarbeets, corn, alfalfa, sorghum, and small grains to reduce the number of white mold sclerotia.
2. Avoid planting in fields with a history of white mold for at least 3 years. If you must plant, use certified seed of recommended varieties of bush or upright vine types.
3. Use recommended plant populations and row widths to promote rapid drying of the plants and soil surface between irrigations after flowering.
4. Soil test and apply only the recommended amount of fertilizer to avoid excess canopy development.
5. Schedule irrigations as required by the crop for satisfactory growth since disease development depends on a moist soil surface beneath the plant. The only way to slow down a white mold epidemic late in the season is to extend irrigation intervals or cease irrigating without stressing seed fill.
6. Apply recommended fungicide sprays (Topsin, Benomyl) to the crop during 100% to full bloom as a protection against infection. The degree of protection depends on good coverage of blossoms that have fallen to the soil surface and in the plant canopy.

FOXFIRE

Stubborn by Nature



Tried and True

Ignore the hype about new varieties. Smart growers continue to stake their future on Foxfire – a reliable producer of high quality, light red, kidney beans. Under varying field conditions in Colorado and other key growing areas, Foxfire's yield and quality continue to conquer the competition.

A Real Fighter

Let Foxfire lead your charge against disease. It has resistance to current races of bean common mosaic virus, so you start with high quality seed. In the field, Foxfire earns your trust by resisting current races of bean rust and tolerating bacterial diseases. This variety even looks like a champion; An upright, determinate bush holds Foxfire's pods above the ground where they're less prone to white mold and water damage.

A Sure Bet

From the field to the combine to the scales, Foxfire proves its worth. Don't be fooled by substitutes. Dealers and growers agree. For high yields of high quality light red kidney beans, Foxfire is the one to bet on.

Type	Light Red Kidney
Maturity	Early. 84 to 87 days.
Color	Rosy, brownish red
Approximate Seed Count	900
Plant Type	Upright, determinate bush
Disease Resistance	Current races of bean common mosaic virus and current races of bean rust.

Harvest the Rewards of Rogers Research... Grow Foxfire.

ROGERS SANDOZ SEEDS®

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