FROM THE GROUND UP

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AGRONOMY NEWS

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ENVIRONMENTAL SOIL SCIENTIST JESSICA DAVIS

Jessica Davis was born in Michigan and raised in suburban Philadelphia. After high school, she worked on a beef and vegetable farm in Tennessee to test her interest in agriculture in a real-life situation. Her farming interest still intact, Jessica attended Cornell University for her undergraduate program in Agronomy and International Agriculture. She chose to enroll at Texas Tech University for a masters program in soil science due to her interest in semi-arid agriculture. Thereafter, Jessica joined the TropSoils program at Texas A&M University where she completed her Ph.D. research in Niger, West Africa.

Colorado State University

Jessica has served on the faculty of the University of Georgia the past six years. Her research has focused on the use of animal wastes (dairy, swine, chicken) to provide nutrients for forage grasses and row crops (peanut, cotton, corn, wheat) while minimizing nitrate leaching and phosphorus runoff. In addition, she studied the impact of fertigation on nitrate leaching and metal toxicities in crops caused by industrial waste application to land.

Jessica's hobbies include playing tennis, scuba diving, listening to jazz (and sometimes playing alto saxophone), and watercoloring. She is looking forward to developing new hobbies enjoying the beautiful state of Colorado. Jessica is also eager to shift from her previous research focus to an extension focus in serving the people and stewarding the resources of her newly adopted state.

CCA EXAM REGISTRATION DEADLINE

There will be two Certified Crop Adviser exams in 1996. The February 2 exam will be given at the Adams County Fairgrounds near Brighton, the same location as in 1995. The August 2 exam will be given in Alamosa. This location was chosen to allow CCA applicants a choice of time and location for 1996.

REMINDER: Obtain your application forms early this fall if you intend to take the February 2, 1996 exam. Send the completed form and the appropriate fee(s) to the ASA Headquarters by December 1, 1995 to insure registration for the February 1996 exam.

The deadline for receiving exam registration papers and fees for the February exam is December 15,1995. All applicants should plan to mail their applications by December 1, because late registrations will be placed on the August exam list.

Those interested in applying for either or both the National and State exams should request an application form from the American Society of Agronomy, 677 South Segoe Road, Madison, WI 53711 (phone 608-273-8080). Their fax number is 608-273-2021. Applicants should also request a copy of the Performance Objectives for the National and/or State exams. Performance Objectives are an outline of the material which will be covered by these exams. ▫Mortvedt

1995 INTEGRATED SOIL & CROP MANAGEMENT WORKSHOPS

Extension Specialists in the Department of Soil & Crop Sciences have designed a workshop program to provide continuing education units (CEU's) for the Certified Crop Adviser program. The two-day workshops will be an annual event at three varying locations within the state. The workshops are designed to present the theory part of soil and crop science and show how this information can be applied to everyday soil and crop management situations. The sessions will emphasize hands-on training.

The three 1995 locations and dates are as follows:

West Slope Workshop:
December 5-6, 1995, 8 a.m.-5 p.m.
Friendship Hall, Montrose Fairgrounds
Montrose, CO
Host: Wayne Cooley

Northeast Workshop:
December 12-13, 1995, 8 a.m.-5 p.m.
Morgan Community College,
Aspen Founders Room
Fort Morgan, CO
Host: Bruce Bosley

Southeast Workshop:
December 13-14, 1995, 8 a.m.-5 p.m.
Otero Junior College,
Room at Student Center
La Junta, CO
Host: Leonard Pruett

An individual who attends the entire two day session will receive 3 CEU's in soil fertility, 3 CEU's in soil & water management, 3 CEU's in crop production, and 3 CEU's in pest management, for a total of 12 CEU's. The program is structured so that an individual can attend one session or several sessions.

By attending both days and all sessions of a workshop, an individual can receive a total of 12 CEU's.

Individuals preparing to take the CCA exam in 1996 are welcome to attend. The workshop is targeted to *learning a few specific concepts* in each of the main categories. Please be aware that all of the objectives covered in the examination will not be covered in this workshop.

Fees, which include lunch and refreshment breaks, will be $35 for one day or $50 for both days. A brochure explaining the workshops in more detail will be mailed out with the October newsletter. For more information please contact Kathryn Apley, Jessica Davis, John Shanahan, or Reagan Waskom at (970) 491-6201. ▫Apley

TESTING SEED AT THE COLORADO SEED LAB

Testing of new or carryover seed is not only important in finding out about the quality of the seed, but also because the test information is required for tagging purposes under the state seed law. The Colorado Seed Laboratory is one of the seed testing labs in Colorado that performs seed tests.

A germination test is the most common seed test. It shows the ability of the seed lot to grow under laboratory conditions. The germination test may also determine if some of the seed is dormant (alive, but not ready to grow at this time). In many cases, dormancy is good in a seed lot because it indicates that the seed will not begin growing until conditions are right for the survival of the plant.

The other popular test is a purity test. The purity test shows the amount of pure seed, weed seed, other crop seed, and inert material in the sample. This test also includes an analysis of the seed lot for the presence of any Colorado noxious weed seeds. Noxious tests for other states can be done for no extra cost.

Other tests that are available include the tetrazolium test, which measures the total aliveness; and seed count and test weight, which are useful information for planting.

More specific information on the seed tests and costs is available in a pamphlet from the Colorado Seed Lab at 970/491-6406. ▫Stanelle

WATER SAMPLING FOR BETTER LAB RESULTS

When submitting water samples for laboratory analysis certain conditions should be met to ensure that the integrity of the sample can be maintained. Sample containers for inorganic analysis should be either plastic or glass. Plastic is preferred since it can be shipped and handled without breaking. If glass is used, the container should have a plastic cap and it should be well packed before shipment. The most common problem with glass containers is that they are received broken or have a metal cap

that can potentially contaminate the sample. Organic analysis requires the use of glass containers, which can be obtained from the laboratory that is doing the analysis.

Small four ounce containers can be used for routine water analysis (major anions and cations); however, larger containers (at least quart size) should be used if additional tests are needed such as arsenic, selenium, or mercury. Large separate samples should be submitted for cyanide analysis and the sample should be sent to the laboratory as soon as possible, preferably overnight. In the laboratory, cyanide samples need to be preserved with sodium hydroxide and stored in a closed, dark bottle in a cool place.

Proper water sample handling provides better lab results and allows for better comparisons of the analyses from one time of the year to another.

Sampling sites can also determine how the results can be interpreted. Samples from wellheads, bathrooms, pond surfaces, pond bottoms, stream surfaces, stream bottoms, culverts, or irrigation ditches can all provide different information. For example, samples from a wellhead can indicate well water quality, while samples from the bathroom can determine the effect of plumbing on water quality. How the sample is taken can also affect the analytical results. Water removed from a wellhead without first flushing the well may be influenced by the well casing material. Conversely, wells that are flushed for 15 to 20 minutes would allow an examination of the water source itself. Water samples taken from a bathroom tap before it is used in the morning may give a good indication of how much lead is leaching into the water from household plumbing. However, if the line is first flushed for several minutes, the water analysis would show the level of minerals or organics from the water supply source. Generally a water sample from inside the house should be taken from the bathroom after the water has run for about 20-30 seconds.

Sample containers should be filled to the top with as little airspace in the bottle as possible. Keep in mind that water inside a well can be in a much different oxidation state than water exposed to the air and the exposure to air changes water samples significantly. Water samples should be kept at 4°C (refrigerator temperature) and should not be frozen. Samples should be transported to the lab as soon as possible. The EPA (Environmental Protection Agency) has indicated that samples should be split with one-half of the sample filtered through a 0.45 micron filter and acidified to pH <2 with nitric acid and the other half kept intact as non-filtered and non-acidified. The acidified sample is for the analysis of metals and can be stored for three to six months. The non-acidified sample is for the analysis of anions, pH, conductance, alkalinity, and other analytes not requiring an acidified sample. Analysis of water samples must be done immediately before the sample has had a chance to change chemically. The EPA has indicated that pH, for example, must be done at the time of collection and that nitrates must be done within 48 hours after collection. For the average homeowner many of these requirements are difficult to meet; however, samples can be handled properly and sent to the lab promptly to minimize the changes that can occur.

Proper water sample handling provides better lab results and allows for better comparisons of the analyses from one time of the year to another. ▫Self

ALL THAT HEMP YOU MAY SOMEDAY SEE MAY NOT BE MARIJUANA

There has been a lot of interest lately in hemp production so I thought it appropriate to give you an update. Hemp (Cannabis sativa) has a long history of utilization by mankind. It was apparently first cultivated in the Himalayas and spread via trade routes to the rest of the world. Hemp has continually been displaced by cheaper or superior fibers. Initially these included cotton, jute, flax and abaca. Hemp production was restricted in 1937 but did not become illegal until after World War II with the discovery of its psychoactive cannabinoids. Plants high in Delta-9 Tetrahydrocannabinol (THC) are referred to as marijuana.

Most hemp raw materials and products are imported from Europe and Asia.

Hemp can be easily grown, although production is illegal in the United States. Hemp products, such as seed and fiber; are not illegal in the U.S. Small U.S. companies are importing hemp for conversion to clothing, food, cosmetics, fiber board, and paper pulp manufacture. Most hemp raw materials and products are imported from Europe and Asia. The word "canvas" was derived from cannabis. Hemp's resistance to rot made it the premier fiber until the early 1940's. Cloth was, and still is, made from the softer bast fibers of the stem. Fiber strength is dependent on the cultivar, growing conditions, timing of harvest, and postharvest handling (retting or decortication).

PRODUCTION TRIALS

Production and research efforts in the U.S. researchers (federal, state and private) have been limited by the need to obtain permits from the Drug Enforcement Agency of the federal government. Permits have not been issued because cannabis is considered a Schedule One narcotic.

Landraces and Cultivars

U.S. varieties (cultivars prior to 1945) are primarily derived from crosses of Kentucky and Italian hemps. Attempts were made to provide fiber quality and sufficient early maturity to produce hemp as far north as northern Minnesota. Virtually all wild (escapes) hemp in the Midwest is probably derived from this group of varieties. Various genotypes show a range of THC content in hemp from 0.06 ppm to 1.77 ppm in the female inflorescence. Marijuana typically has a THC content in excess of 10 ppm. Research has shown that dense spacing of marijuana types severely reduces THC production, making them similar to hemp. The international threshold of acceptance of THC is 0.3% ppm to be considered as having drug potential.

Diseases and Insects

Hemp appears to be resistant to all major crop pests and diseases. In countries where hemp production has been continuous, no pests have been noted.

Processing and Returns

Fibers from hemp have traditionally been retted. Retting involves submersion of the stalks in a pond or lake until rotting releases the fibers. "Dew retting" is when stalks are moistened through a winter to release the fibers in the spring. The cost of retting is extremely expensive with retted hemp fiber typically selling for $320 per ton. The hemp "hurds" are the remaining inner portion of the stalk that are broken into pieces. Hurds have been used as animal bedding and have a value of about $1 per ton. Current value would be expected to be $600 to $700 per acre.

Markets appear to be small and localized but with good growth potential.

Processing per Ton of Hemp Stalk, 1995

4,000 lbs of hemp fiber @ $40/cwt	$ 1,600.00
18,000 lbs of hurds @$3.40/cwt	$ 612.00
Return per ton (fiber)	$ 868.00
Return per acre (fiber)	$13,020.00
1400 lbs of seed @ $19.50/cwt	$ 273.00
Sale of chopped stalks for fiberboard	$ 1,125.00

PRODUCTION

Seeding

Seeding depth should be 1 to 2 inches with row spacing being 4 to 7 inches when using a drill. The higher the plant density, the higher the fiber yield. Seeding rates vary from 35 to 140 lbs per acre with a plant stand of 20 to 70 plants per square foot. At these densities, weed control is unnecessary. Soil temperatures at seeding are best at 48° F (10° C) which may occur between late March and early May. Seedlings are relatively frost tolerant. Earlier planting generally yield the best crop.

Growth

Hemp grows best at temperatures of 55° F to 80° F. It is a high water user, especially during the seedling stage and through the first six weeks. Hemp can grow to a height of 6.5 to 13 feet under cultivation. It is a short day plant, maturing in early fall. Hemp prefers neutral to slightly alkaline soils. Nutrient requirements during growth (compared to small grains) are two to three times greater for nitrogen, three to six times greater for phosphorus, and ten to twenty times greater for potassium.

Harvest

Harvest for fiber should occur as soon as the crop is in flower. Harvest for seed occurs four to six weeks after flower. Sickle mowers, hay binders, and round bailers have been used with some success if the hemp is intended for pulping or the fiberboard industry. For long bast fibers, only a sickle mower would be useful. Bast fiber production will require the stem be allowed to ret for several months. Dew retting generally requires the stems be left in the field and frequent wetting by rain, snow, or irrigation be applied. Generally, four to six weeks are required. Water retting requires a large lake or pond where stalks can be submerged for 7 to 10 days. Variations on water retting are warm water retting, chemical retting, and green retting (mechanical retting). •

Processing

Retted stalks are decorticated, "scutched", hackled, and combed. Decorticators and scutchers are used to separate fibers from the hurds. Fiber go into thread, twine, cordage, cloth, rope, and fine paper. Hurds are used for paper, rayon, cellophane, and food products. Seeds produce oil and meal. One problem could be the total lack of processing facilities within 1,000 miles of Colorado. Sending unprocessed stocks of hemp out of the state would probably not be economically feasible.

Marketing

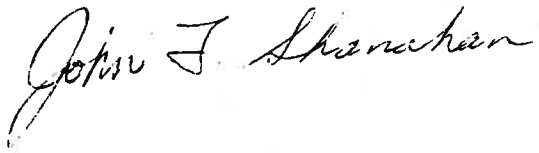
Marketing of hemp products seems to not be a problem. I was surprised to find that you can buy hemp fiber as a textiles product, hemp seed oil, and hemp seed protein meal. Markets appear to be small and localized but with good growth potential.
▫Johnson

REFERENCES:
Hemp Today, Ed Rosenthal, ed.1994. Quick Trading Company. P.O. Box 429477 San Francisco, CA 94142-9477. 444 pp.

Hemp. Dec. 16,1994. Gordon Reichert. Policy Branch of Agriculture and Agri-food Canada. Adaptation and Grain Policy Directorate P.O. Box 6200 4th floor 200 Graham Ave. Winnipeg, Manitoba R3C 4N1

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

Sincerely,



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