

Higher Education Viability at Risk

The State of Colorado Legislature recently passed the state budget for fiscal year 2005 (beginning July 1, 2004). Higher education was spared another year of historical budget cuts, but this may have only been a one year reprieve. The budget for FY 2005 maintains the General Fund for the University system at FY 2004 levels. The reality is that this will translate into a cut, albeit a much smaller one than in recent years, to CSU and other universities as a result of not offsetting rising costs with additional operating funds.

At CSU, the State General Fund reduction from FY 2002 to FY 2004 totaled 23.2%. According to figures in a national database from The Center for the Study of Education Policy, the cumulative effect of the Colorado General Fund reductions and minimal tuition increases in FY 2003 and FY 2004 have combined to yield the worst two-year financial setback for public higher education anywhere in the country since the database was created in 1961.

The General Fund cuts to higher education are likely to resume in subsequent years as a result of unintended consequences of three constitutional amendments – the Taxpayer Bill of Rights (TABOR), Amendment 23, and the Gallagher Amendment. Tuition, tax revenue, and fees are considered TABOR revenue. TABOR limits state revenue growth to a value equal to inflation plus the percentage of population growth. Most importantly, the increase in revenue is based upon the prior year’s revenue base. Thus, in a weak economy where state revenue falls short of budget expectations, the subsequent year’s revenue base is reduced. This “ratcheting down” effect results in significant funding reductions in lean years, and limits any potential recovery due to the constraints on state revenue growth in better economic times. In an economic recovery, any rebound in state revenue exceeding the base plus population growth and inflation is refunded to the taxpayer. The combination of significant cuts and limits on funding recovery results in cuts which become permanent under the current system, further eroding support for higher education.

Amendment 23 guarantees funding increases for K-12 education based upon enrollment growth plus 1% in addition to the rate of inflation. The Gallagher Amendment requires that 55% of all personal property

taxes originate from commercial property. Due to more rapid growth in personal property value than commercial property, residential property is only assessed at approximately 8% of its market value, limiting state property tax revenues. This has resulted in a greater portion of the State General Fund being used for K-12 mandated funding increases. The combined impact of TABOR, Amendment 23 and the Gallagher Amendment is that a higher percentage of the State General Fund must be used to fund increases in mandated and protected programs such as K-12, Medicaid and Medicare. Approximately 85% of the state’s budget (FY 2004) is allocated to such programs. Higher education is the largest single expenditure of the remaining 15% of the state budget that can be cut to balance the budget. The Agricultural Experiment Station, like the other agencies (Cooperative Extension and the State Forestry Service) receive no tuition income, thus potential tuition increases (which would be considered TABOR revenue) do not offset General Fund cuts in those organizations.

Since 1990, higher education’s share of the State General Fund in Colorado has shrunk from 20.3% to less than 11%. Based upon State General Fund projections (<http://www.cu.edu/challenges.pdf>), Colorado colleges and universities will no longer receive state funding beginning in the year 2010. Several years prior to that, significant cuts in services and personnel will be required to offset the shrinking pool of General Fund dollars allocated to higher education. This is the ultimate result of the ratcheting down effect under the current budget constraints.

This complicated issue has drawn much attention in the legislature this spring, and there will likely be some ballot initiatives this November which attempt to address the budget constraints. Prior to the election, the Agricultural Experiment Station intends to conduct statewide meetings to discuss the budget issues and initiatives in detail. We will advertise any meetings of this type on the western slope in advance, and anyone wishing to learn more about this issue is welcome to attend.

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Vegetable Research Continues to Expand at Rogers Mesa

There are an increasing number of farmers in western Colorado that are growing high value crops such as vegetables for niche markets, i.e. farmers markets and CSA's (Community Supported Agriculture) in western and eastern Colorado. In the past five years, research has been conducted on broccoli and winter squash. This year, onions, tomatoes, peppers, sweet corn, broccoli, winter squash and snap beans will be evaluated at the Rogers Mesa site. This is a unique opportunity to investigate the kind of insect species and diseases which might attack crops grown at 6000 feet elevation. Fourteen varieties of peppers and fourteen varieties of tomatoes will be evaluated for insect and disease pressure, yield, and quality. The tomatoes and peppers will be a mixture of heirloom and hybrid varieties. The tomatoes will consist of six varieties of fresh market slicing tomatoes, four processing varieties, three drying varieties and one grape tomato variety. The pepper varieties were divided into five varieties of chili peppers, three varieties of paprika peppers, three varieties of sweet peppers and three varieties of ancho/poblano peppers. The information to be derived from the research includes determining the kinds and population levels of insects and diseases attacking the different varieties of tomatoes and peppers. In addition, yield and quality data will be recorded.

Sweet corn, onions, winter squash, and broccoli will be planted to conduct organic and soft pest management research. In onions, controlled trials will be conducted on onion thrips. This research will be in conjunction with research being carried out by Bob Hammon (Cooperative Extension) near Delta. A one-acre sweet corn plot will be planted to investigate various organic control options for corn earworm and sap beetle. Organic control options for the control of squash bug will continue this year in winter squash. Various strains and formulations of *Bacillus thuringiensis* (B.t.) will be tested for efficacy against the lepidopteran (caterpillar) complex attacking broccoli. In addition, Dr. Ron Godin, is evaluating corn gluten meal as a possible organic pre-emergent herbicide in broccoli.

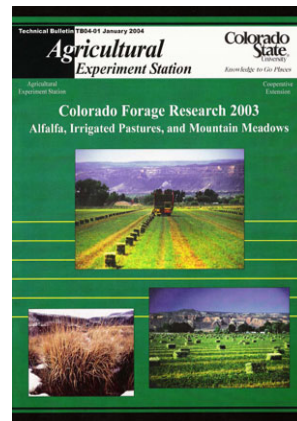
All vegetable crops will be irrigated with drip irrigation. In addition, the peppers, tomatoes, winter squash and broccoli will be planted into plastic mulch. The color of the plastic mulch will differ according to plant species; green mulch (peppers), red mulch (tomatoes), black mulch (winter squash) and white mulch (broccoli). The plastic mulch conserves moisture, reduces weed pressure, and contributes to increased quality and yield. The beans, onions, and sweet corn will not be planted into a mulch cover.

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New Forage Bulletin Now Available

A new technical bulletin entitled, "Colorado Forage Research 2003: Alfalfa, Irrigated Pastures, and Mountain Meadows," was recently published by the Colorado State University, Agricultural Experiment Station. This 113-page book presents current research results of numerous forage research projects conducted in Colorado.

The forage report consists of eighteen articles. Seven articles present the latest information on alfalfa variety trials conducted around the state, eight articles are on irrigated pastures and other forages, and one article presents research findings on mountain meadows. Two articles are special topics and are entitled, "Making Hay the Right Way," and "Potential for Selecting Alfalfa Varieties Based on Forage Quality."



Forages are one of the most important agricultural crops in Colorado. According to the 2003 Colorado Agricultural Statistics, hay crops (alfalfa, grass, and other) in Colorado were valued at more than \$480 million in 2001 and \$366 million in 2002, making them the state's most valuable crops in these 2 years. It is not unusual for hay to be Colorado's most valuable crop, often being worth substantially more than corn or wheat.

The technical bulletin has been published to provide producers, Cooperative Extension personnel, crop consultants, industry representatives, federal and state agency personnel, and the general public with the latest information obtained from research trials conducted at different locations around the state by CSU researchers. Sixteen authors and co-authors contributed to the forage bulletin. Editors of the bulletin, Joe Brummer and Calvin Pearson, are both from the Western Colorado Research Center.

A diversity of plant species is used for forage production in Colorado. Plant species used for forage production can be annuals, such as turnips, various small grains, and peas; or they can be perennials, such as alfalfa and a number of grass species. Forage production is accomplished under a wide range of management and production conditions. Such a range of plants, environments, and diverse producer situations used for forage production in Colorado creates a considerable ongoing need to conduct forage research.

Forage bulletins are available free of charge. To obtain a copy of the bulletin or for more information about this publication, contact Calvin Pearson at Calvin.Pearson@colostate.edu or Joe Brummer at jbrummer@lamar.colostate.edu.

Production of Container-grown Cliffrose Plants in Three Environments using Several Irrigation Methods

A project on container-grown cliffrose (*Cowania mexicana*), conducted in two retractable roof greenhouses and a container yard, was carried out during the 2003 growing season. Several irrigation methods were evaluated; these included overhead irrigation, bottom irrigation, and direct watering of individual pots. These irrigation methods were evaluated with and without a modified capillary mat system.

The focus of this trial has been on water conservation. The plants from plots that combined the bottom irrigation and a modified capillary mat required the least water. The plants from plots where water was applied directly to the pots produced the largest amount of dry matter but used the most water. The system based on integration with capillary mat technology and bottom irrigation, the initial catalyst of this work, needs further development to reduce and manage an excessive build-up of salts in the growing medium, especially when marginal quality irrigation water is used. Another technology tested, retractable roof greenhouses, provided a growing environment that resulted in irrigation water savings over plants grown outside, in the container yard.

The cliffrose plants were grown in 3 gallon containers. The need for irrigation was determined by water status of the growing medium, established visually, tactility, and with a Time Domain Reflectometry (TDR) device. The plants grown in the container yard, where plants were exposed to direct sunlight, had to be irrigated most frequently and required on average of 41 gallons of water per pot per season. The plants grown in retractable roof greenhouses required 36 gallons per pot per season. The plants in the overhead irrigation treatment without capillary mat required most water: 47 gallons per pot per season; while plants that were bottom irrigated on capillary mats, used the least water, irrespective of the growing environment, an average of 30 gallons per pot per season. The water requirement of overhead irrigation with capillary mat treatment, and the two direct water application treatments were similar, requiring an average of 37 gallons per pot per season.

Plant productivity, expressed as above ground plant dry weight, differed considerably among irrigation treatments. Plants from pots that were directly watered, both with and without capillary mats, outperformed the other treatments with average dry weight per plant of 49 grams. Plant productivity of the remaining treatments was similar, 29 grams dry weight per plant. The dry weight of plants varied between the different growing environments from an average of 35 grams for the container yard, to 40 grams for the peak roof greenhouse, to 36 grams for the flat roof greenhouse.

The electrical conductivity (EC) or total salinity of the growing medium, was measured following the completion of the experiment. The EC ranged from 2.1 dS/m (deciSiemens

per meter) for direct watered pots to 13.6 dS/m for the bottom irrigated plants. The medium from the overhead irrigated pots ranged from 5.1 dS/m for pots without capillary mats to 6.8 dS/m for pots on the capillary mat.

These differences of growing medium EC likely explains differences in plant productivity. The pots that were directly irrigated had the lowest EC of the growing medium and the plants from these treatments outperformed plants from other treatments. This relationship was consistently observed across the 3 growing environments tested.

The retractable roof greenhouses, utilized for growing plants in this trial provided water savings and this technology should be considered as a water conservation tool. The uniqueness of the retractable roof greenhouse technology is its minimal energy usage as these structures do not require energy and water-intensive cooling systems that are necessary for conventional greenhouses.

Our current recommendation, based on experience gained from this trial and working with container-grown crops in general, is that the most effective irrigation system for these crops is based on direct water application to individual pots. Another potentially promising system, based on integration of bottom irrigation and modified capillary mats, has not proved to be satisfactory at this time and needs further development to address the excessive build up of salts in the growing medium.

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CSU-WCRC Foundation Seed Program Upgrades Facility

During spring 2003 the CSU Western Colorado Foundation Seed Project purchased a new air- screen cleaner. A Clipper Prelude 526 was selected to replace the 1940's vintage Clipper we had used previously. The new Prelude cleaner has many advantages. It has a larger total capacity of 150 bushels an hour, has three times the screen area to provide a cleaner product, and parts can be readily obtained compared to the old Clipper. The new machine will also be much safer to operate.

During fall 2003 renovation of the dry bean cleaning plant began. Every piece of equipment in the conditioner room was removed. A new frame was designed and fabricated for the Prelude cleaner. The frame was designed with a shorter overall height than was used for the old cleaner. Frame pieces that could catch and trap seed were eliminated or modified, making cleanout between varieties and seed lots much easier. A new metal surge bin was fabricated to deliver seed to the gravity separation equipment. The surge bin was designed to be self cleaning and replaces a wooden bin that was difficult to clean. Bin capacity was also increased. The gravity table was raised 6" in height off the floor to improve seed flow to de-stoning equipment and the gravity table was anchored to the floor more securely. During summer 2004 a catwalk will be fabricated

around both the surge bin and the new air-screen cleaner.

These improvements will increase the quality of the conditioned seed, improve operator safety, and modernize the appearance of our seed conditioning plant.

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New seed cleaner will improve the quality of conditioned seed.