

**Fertilizer Prices Skyrocket – What Should I Do?**

On April 21, 2008, the local fertilizer supplier quoted the price per ton of anhydrous ammonia at \$1,012 and the price of diammonium phosphate at \$1,157. The cost of fertilizer has skyrocketed recently to unprecedented highs and may continue to climb. This leaves farmers wondering how they can afford to buy fertilizer for crops they will be growing during the upcoming cropping season. The cost of fertilizers has bounced around over the past five decades but has never reached these astronomical levels (see graph below). Certainly, at these skyrocketing prices growers must get the most out of their fertilizer dollars.

The costs of many inorganic fertilizers are directly affected by the price of natural gas. Natural gas is used to make anhydrous ammonia by combining natural gas with the atmosphere at high temperature and high pressure. Most other popular forms of nitrogen fertilizers are made with anhydrous ammonia. Prices for combination fertilizers, such as diammonium phosphate are also going through the roof (see graph below).

As a precaution, growers must be careful not to take the approach of discontinuing the use of fertilizers or reducing application rates by too much until prices come down. Crop plants that do not have sufficient nutrients either supplied by the soil or supplemented with fertilizer applications will not be vigorous, may not economically profitable, and may be subject to disease and insect pressures. At these high fertilizer prices, over applying fertilizer is prohibitively expensive and not environmentally wise. Thus, it is critical that growers apply fertilizer at rates that make sense.

One of the first step growers can take to cope with these high fertilizer prices is to determine realistic yield goals and then determine the amount of plant nutrients needed to reach the planned yield goals. Fields should be soil sampled properly and analyzed by a reputable soil testing laboratory to determine the amount of fertilizer needed to supply the nutrients for a crop in a particular field. This brief explanation is an over simplification and there are many factors that can affect soil sampling, testing, and fertilizer recommendations and applications. A few more thoughts about this topic are bulleted below.

- Accurate fertilizer recommendations depend on obtaining a representative soil sample. Soil sample fields using appropriate soil sampling tools and methods.

- Use a reputable soil testing laboratory that uses reliable and proper testing methods for your soil and your area.
- Apply fertilizers using the proper equipment, application timing, rates, and positions to obtain an optimal crop response.

There is a lot of excellent information that is readily available from various sources, including reputable web sites, Extension and Agricultural Experiment Station offices, fertilizer suppliers, and crop consultants.

Growers would be well served to spend some time reading and studying information about proper soil sampling, soil analysis, and fertilizer application to keep fertilizer costs down and optimizing crop yields and profits for their farming or ranching operation. Thanks to Rod Sharp, Extension Specialist, for providing me with the fertilizer price information.

For further information contact Dr. Calvin Pearson at [calvin.pearson@colostate.edu](mailto:calvin.pearson@colostate.edu).

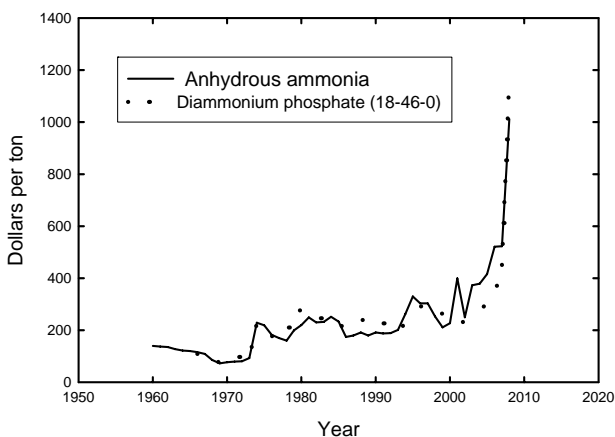
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Price of wheat at Dodge City, Kansas over a 18-year period from 1991 to 2008

### Strawberry in Styrofoam boxes in greenhouse

Clark Oman of CSU will be performing residue trials in strawberry in the WCRC-OM greenhouse for the IR-4 program. The spray is Tetraconazole which has been effective in preventing powdery mildew and Botrytis in other crops. In order to maximize use of the small area provided, the crop is being grown in a vertical pot system (figure). Four plants are planted in the corners of square Styrofoam pots. They are then stacked seven pots high on pipe supports, resulting in twenty-eight plants per stack. In a two row plot roughly four feet wide by ten feet long, this system effectively supports 560 plants. The crop is watered with a drip system via sump pumps submersed in barrels of fertilizer-infused water. Once flowering commences, specialized greenhouse bumble bees are brought in to facilitate pollination. When the berries approach harvest, the research spray is applied. Berries are harvested, frozen on-site, and shipped to IR-4 laboratories for residue analysis.

In February, a pre-trial was initiated to evaluate best plant material and growing media. Of the ten different varieties of strawberry plants, Seascape was the best performer in growth and production. The two media tested were a commercial potting mix and a coconut husk/perlite mix used in hydroponic applications. The commercial mix was by far the better performer. After selections of species and media, the actual trial was established in early April.

There are many reasons this project is being performed at WCRC-OM. Space for this project proved difficult to find on CSU's main campus. Much of the space on cam-



Strawberries grown in a vertical pot system in a greenhouse at WCRC-OM.

pus also has major thrips problems. Thrips sprays are very detrimental to indoor bee populations. In contrast, the greenhouses at Orchard Mesa provide Clark Oman with a “bee friendly” environment. In addition, the short duration of this project corresponds well with the ongoing research at WCRC-OM. While the scope of this trial is only for IR-4 purposes, it could also have horticulture value for strawberry growers faced with limited space for production.

For more information on this project, please contact Bryan at [bryan.braddy@colostate.edu](mailto:bryan.braddy@colostate.edu)

### Wheat Prices Entice Spring Plantings

Wheat prices have shot up in recent weeks to eye popping levels, prompting growers to consider planting spring wheat. Wheat prices have bobbed up and down at marginal levels for many years, but recently prices have skyrocketed (see the graph below). While these wheat prices may be tempting to growers to plant spring wheat, growers should give careful consideration to planting spring wheat before they head out to the field to plant. Our research results, obtained over the years, have shown that planting spring wheat and barley in many of the low valley areas of western Colorado typically results in disappointingly poor yields. Additionally, spring wheat and barley plantings can be more challenging and costly to control Russian wheat aphid infestations. I have had a few calls from growers who were considering planting winter wheat early this spring. This is risky because winter wheat requires vernalization in order to produce a seed head and hence grain. Vernalization is the requirement of specific wheat varieties that must experience a sufficient cold period to stimulate reproductive growth and grain production.

During 2006-2007, I evaluated 18 winter wheat varieties comparing those that have been recently developed to those that have been traditionally grown in western Colorado. Given the new winter wheat cultivars that have been released in recent years and interest in market classes other than soft white wheat, I planted winter wheat entries that included soft white, hard white, and hard red winter wheat varieties. Grain yields of the winter wheat varieties averaged 7361 lbs/acre (122.7 bu/acre). Grain yields ranged from a high of 8526 lbs/acre (142.1 bu/acre) for Bond CL to a low of 5833 lbs/acre (97.2 bu/acre) for Hayden.

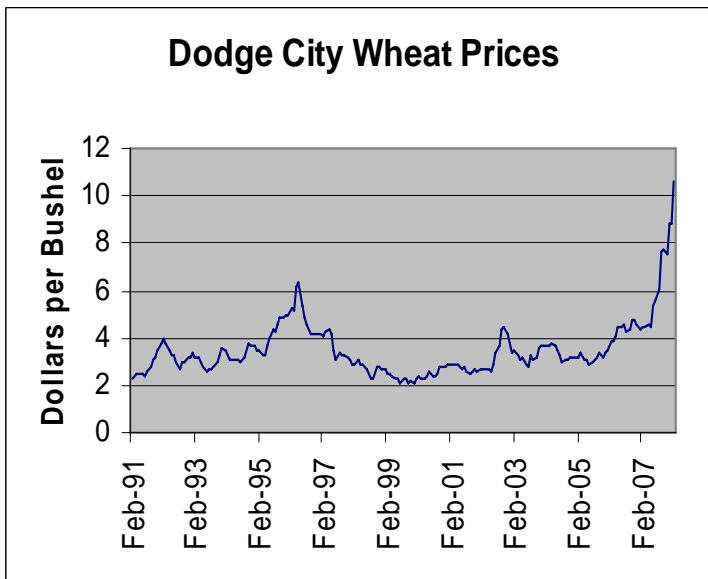
In 2007-2008, I planted a repeat trial to obtain another year of data. Data obtained from these two years will aid growers and industry representatives to determine which varieties and market classes could be produced in the valley areas of western Colorado. Also, for more than 20 years, we have conducted annual small grain variety performance tests in the Craig/Hayden area. The results from these trials are intended to provide decision-making information for producers in northwest

Colorado.

A number of other wheat trials are conducted each year around the state and the research results of these trials are available on the web. The website for wheat research results along with a number of other agronomic crops is [www.csucrops.com](http://www.csucrops.com).

Thanks to Rod Sharp, Extension Specialist, for providing the wheat price information.

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Thus, there could be a link between split-pitting / soft-suture and the combination of variety / spring frost injury / irrigation application duration.

A study proposal was developed for WCRC researchers to look at this link during the 2008 season and shared with campus administration and industry. The Colorado State University Department of Horticulture and Landscape Architecture provided \$7,500 toward the study and individual growers, the Western Colorado Horticultural Society, and the Colorado Organic Crop Management Association combined to match that and provide a total of \$15,000 for the study. The study will look at frost injury to young fruit just after shuck-fall (induced by freeze packs to fruit on the tree), extended irrigation sets at different times during the 6 week period prior to pit-hardening, sugar content of early and late maturing peach varieties during this 6 week period, and incidence / severity of split-pitting and soft-suture just prior to harvest. Two locations are being used, the WCRC-Orchard Mesa station and the Neil Guard peach orchard on Orchard Mesa. WCRC's Professor Emeritus Dr. Matt Rogoyski, who retired officially as of February, 2008, has been hired on a part-time basis to carry out the study. Results will be shared with industry at the 2009 WCHS Convention and through the WCRC Annual Report for 2008 next spring. (H. Larsen)

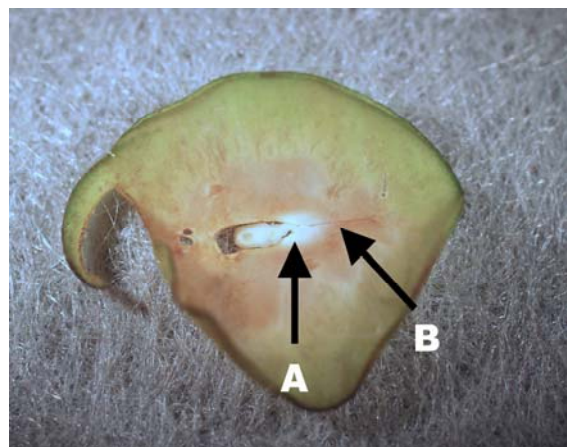
For more information contact Dr. Harold Larsen—[harold.larsen@colostate.edu](mailto:harold.larsen@colostate.edu) or Dr. Matthew Rogoyski at [matthew.rogoyski@colostate.edu](mailto:matthew.rogoyski@colostate.edu).

Price of anhydrous ammonia and diammonium phosphate from 1960 to early 2008

### Industry and Colorado State University Pool Resources to Study Peach Split-Pit / Soft-Suture Problem

Split-pits and soft-suture are recurring causes of crop loss to peach and nectarine growers in Colorado and elsewhere. Estimated loss to growers in 2007 was ~15-20% of the total crop, with an estimated valuation of \$3 - 4 million. This was a significant impact on production and prompted questions regarding the cause and possible ways to reduce the incidence of these problems.

Potentially serendipitous observations during the season noted that incidence was not universal, that some growers with the same peach varieties (typically early maturing varieties) that were severely impacted in some orchards had little or no incidence in their orchards. Orchard blocks with the greatest incidence and severity tended to be ones which received extended irrigation duration sets of greater than 18 hrs, usually 24 hr irrigation runs, during the 4 to 6 weeks leading up to pit hardening which typically occurs in mid-June. Late maturing varieties usually have few split-pits and rarely have much problem with soft-suture (generally limited to spring frost years with unusually hot weather in late May - mid-July).



Section of young nectarine fruit cut transversely through the suture (arrow B) to show the attachment (funiculus, arrow A) of the embryo to the fruit wall. Moderate frost injury to the funiculus results in fruit that fails to grow beyond thumbnail size.

## Our aim is to solve disease problems for both conventional and organic fruit growers.

Fruit diseases, despite their causes (Fungal, Bacterial, Viral and Nematode), are important to crop plants, irrespective of locations, varieties, environmental conditions and growth stages. Among these diseases, cytospora canker, rasp leaf virus complex, replant diseases and problems of plant parasitic nematodes are important ones for fruit production in western Colorado. Endeavors to solve these problems for both organic and conventional growers are in progress in Western Colorado.

**Cytospora** is an important disease of stone fruits. However, information on incidence and severity in western Colorado fruit orchards is limited. This might be due to lack of disease measurement scales. To facilitate the investigation on Cytospora disease measurement, a disease rating scale of 1 to 9 where 1= healthy and 9= dead trees due to Cytospora was developed and used to measure the disease incidence and severity in western Colorado fruit orchards. Disease management is the major challenge due to lack of effective chemicals. Benlate, Topsin-M and captan were reported to be effective in controlling Cytospora through the laboratory studies, but some growers found they are effective only when combined with 50% water and ethyl alcohol.



Peach tree with severe gummosis due to cytospora canker

Since Benlate is no longer available for purchase, we initiated the investigation to test the efficacy of carrier materials (water, ethyl alcohol and methyl alcohol in different ratios) for Captan, Topsin-M and Pristine. Two experiments in peaches and one in cherry are underway. Similarly, efficacy of different *Brassica* products and plant oils (clove oil, neem oil, thyme oil, cinnamon and camphor oils) in water and methyl alcohol are being tested, for possible use by organic growers. The results of these studies are expected to be available by the end of 2008.

**Replant**, caused by growing stone fruits after stone fruits, is another problem for stone fruit growers. The etiology of this disease varies from orchard to orchard, but this problem is highly prevalent in fruit orchards of Colorado. Attempts are being made to search for the al-

ternative chemicals to methyl bromide, a very effective chemical no longer available due to environmental concern. In recent studies, chloropicrin, MIDAS 98, MIDAS33 and methyl iodide applied at the rates of ½ lb or more per tree hole managed the problem effectively if applied in proper way. In addition, a search for alternative non-chemical approaches such as soil solarization, amendments of *Brassica* as green manures or meal cakes, compost, poultry manures and their combination to manage this problem is underway. Preliminary results indicated a potential of using soil solarization and different forms of *Brassica* in western Colorado..

**Cherry rasp leaf virus**, is an important viral disease of sweet cherry and apple in Colorado. It is vectored by members of the dagger nematode *Xiphinema* spp. Two species of dagger are reported from Colorado, *X. thornei* and *X. utenhansii* but their role in the spread of cherry rasp leaf is not clear because of variability within the genus which impacts identification of the species found in Colorado. Thus, studies are in progress on this and on identification at the molecular level. Other studies are underway to examine this virus /vector relationship, the role of stone fruit rootstocks and developing chemical and non-chemical management options.



Symptoms of rasp leaf virus in cherry.

**Plant Parasitic nematodes** are considered as one of the important unnoticed problems in fruit production. High densities of some of the nematodes observed in orchards have created interest in these entities, but the lack of conspicuous above ground symptoms in plants makes it very difficult to assess their incidence and their role in fruit production. Thus, surveys of plant parasitic nematodes are underway to understand the association of PPN with different fruits,.

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### New Projects approved:

Recently, Dr. Ramesh Pokharel, got approval for two new projects: **Survey of plant parasitic nematodes associated with onion crops in Colorado**” funded through Colorado Onion Association. and **“Increase efficacy of biofumigation by soil sterilization and integrating with *Brassica* meal cake and poultry manure to manage soil-borne problem in onion**” by Pesticide Environmental Stewardship Program (PESP) of EPA to be undertaken in 2008-09.

### Competitive Grant Funds Living Mulch Research Project

Soil erosion and the high cost of fuel and fertilizers are critical issues that threaten the sustainability of agricultural systems. Integrating “living mulches” with irrigated cropping practices can potentially offset these environmental and economic issues. Living mulches consist of perennial plants used as cover crops in the production of annual cash crops. Living mulches can decrease soil erosion, suppress weeds, improve soil structure and nutrient cycling, sequester carbon, protect seedlings of other crops during establishment, and supply nutrients to the associated crop, especially nitrogen when using legumes. A major advantage of perennial living mulches is that they provide soil cover all year since they do not have the regular establishment periods required for annual cover crops.

Living mulch systems have been developed for the upper Midwest and Northeast under rain-fed conditions, but not for the semi-arid West. The ability to control the timing and amount of water applied in an irrigated cropping system should add to the success of a living mulch under irrigation. The objectives of this research project are to: 1) determine methods of establishing various perennial plant species potentially adapted for use as living mulches under irrigation, 2) evaluate methods of suppressing living mulches that both conventional and organic producers can use to avoid reduced yields of associated crops, 3) quantify the environmental and economic benefits of using living mulch systems under irrigation, and 4) demonstrate the benefits of using living mulch systems for crop production under irrigation to producers through on-farm trials.



Strip tilling in a kura clover living mulch system in preparation for corn planting at the

This 3-year project is being funded by the Western Sustainable Agriculture Research and Education (SARE). SARE is a program of the USDA that funds competitive grants to support research conducted cooperatively by researchers, farmers, ranchers, and agricultural professionals to develop agricultural technology that is profitable, environmentally sound, and acceptable to local communities.

This living mulch research project will be conducted at Colorado State University’s Agricultural Research, Demonstration, and Education Center at Fort Collins and the Western Colorado Research Center (WCRC) at Fruita and two on-farm producer sites. These sites represent diverse environments within Colorado that will have direct application for producers in surrounding states. Plot studies will be used to evaluate potential species for use as living mulches including alfalfa, birdsfoot trefoil, crownvetch, and red, white, and kura clover. Only legumes will be investigated because of their nitrogen fixing capability. Species evaluated will be seeded alone, in mixtures, or with cover crops such as small grains and corn. Several rates of starter nitrogen will be evaluated as a method of improving establishment. Broadcast and band applications of herbicides and strip tillage (see photo) will be evaluated in conventional and mowing, flaming, and strip tillage in organic cropping systems as methods of suppressing the living mulch to avoid yield reductions of associated crops. Besides crop yields, return flow water quality will be monitored along with yield and quality of the living mulch and crop aftermath that could be utilized as forage.

This is a collaborative research project with Drs. Joe Brummer, Neil Hansen, and Calvin Pearson. Drs. Brummer and Hansen are faculty members in the Dept. of Soil & Crop Sciences on campus in Fort Collins and Dr. Pearson is also a faculty member in the same department but is located at WCRC at Fruita and is an employee of the Agricultural Experiment Station. Bruce Bosley, extension agent in Logan and Morgan Counties, is also cooperating on the project.

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