

# Hort farm holds a wealth of research

ROCK SPRINGS — Visitors to Ag Progress Days can see Penn State's horticulture farm where much the field research on tree fruits, and on vegetables for Pennsylvania is being conducted. Rock Springs is located just nine miles southwest of State College on Route 45. Rock Springs provides a living laboratory for teaching purposes and for demonstrations of new ideas and concepts. The research will be on display as part of Penn State's Ag Progress Days Tuesday through Thursday.

You can also see field research on small fruits, ornamental horticultural crops and greenhouse construction. This research is supplemented by field plots located throughout the state on grower farms and greenhouses, and at stations at Biglerville (mainly tree fruits), North East (mainly grapes), and Landisville (mainly field crops).

The horticulture farm at Rock Springs was started about 25 years ago, having moved from various locations on the main campus. Rock Springs comprises 1,500 acres, 160 acres of which can be irrigated from two large water reservoirs located on the side of the mountain. Before becoming a research farm, the area was in general farming. Some of the original farm buildings are still in use. Other structures have been added over time to improve the research capabilities of this important facility for Pennsylvania's agriculture.

Funds for its operation come from the state, federal government, various grower groups, and from industry. Besides specific grants for various research areas, industry helps in supplying materials such as pesticides, herbicides, fertilizers and plant growth regulators.

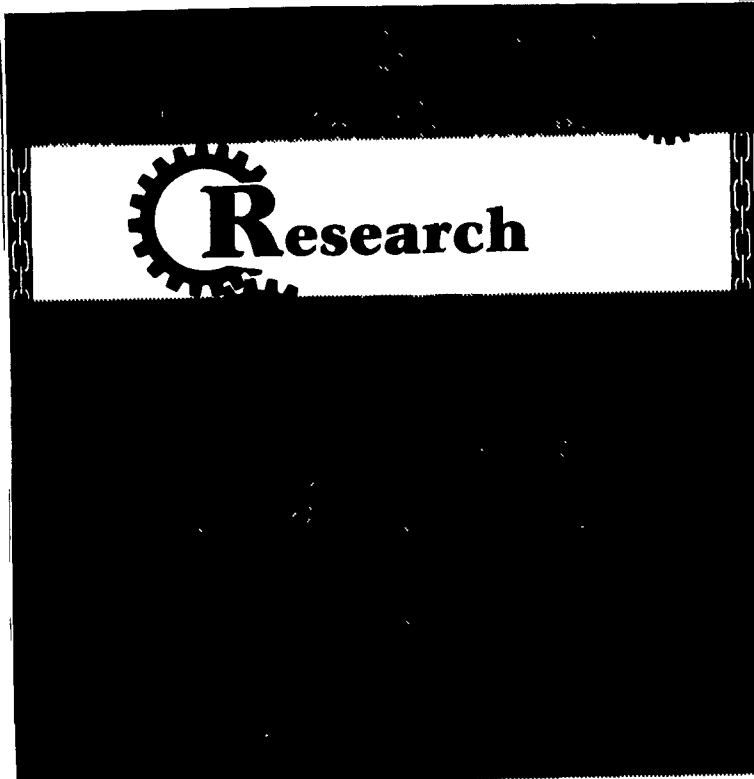
Horticulture research at Penn State includes: breeding, variety testing, and new crops; plant physiology and growth regulators; nutrition; post-harvest physiology, or storage and handling; mechanization; and general culture and productivity.

Crops include: greenhouse floriculture crops; ornamental crops and nursery plants; greenhouse and field vegetables; and fruit tree and small fruit crops.

The work is being done by the departments of agricultural engineering, plant pathology, entomology, and agronomy.

## Tree Fruit

Tree fruit research at Rock Springs is primarily with apples. Under study by Dr. Loren Tukey, professor of pomology, are various intensive orchard systems to maximize the productivity of a unit of land. These include the Penn State low trellis hedgerow, the Dutch slender spindle, the hoop skirt and the French AXE (the tail support system). Trees are as close three feet in the row with rows 10 to 12 feet apart. Yields average from 900 to 1200 boxes per



acre, but have been as high as 2000 boxes at 12 years of age. Besides demonstrating early high yields, trees are of a form more easily managed from a labor standpoint.

Producing dwarf plantings involves tree training, and the use of tree-size controlling rootstock. Various plant growth regulators are used to aid in enhancing flowering, fruit set and fruit growth. Some plant growth regulator plots are for long duration studies; others are for exploring and developing the use of new regulators showing potential in vegetative control and cropping.

Rock Springs is also one of 25 locations across the United States and Canada for the National Rootstock Trail for Apples. In addition, rootstock research is concentrating on dwarfing forms from Russia, Poland, France, Germany, England and the United States. The fruit tree nursery contains stoolbeds of these rootstocks for propagating trees of various varieties. Many of the trees are propagated on the farm.

Although M.9 and M.26 have been the main apple rootstocks used in the past, newer plantings are being made with M.27, a more dwarfing rootstock.

In the plantings, there are over 50 different apple varieties and variety sorts, while provide knowledge on tree fruit productivity, growth habit and fruit quality. There are about 15 acres of tree fruits of all ages. This research is under the leadership of Dr. Loren Tukey.

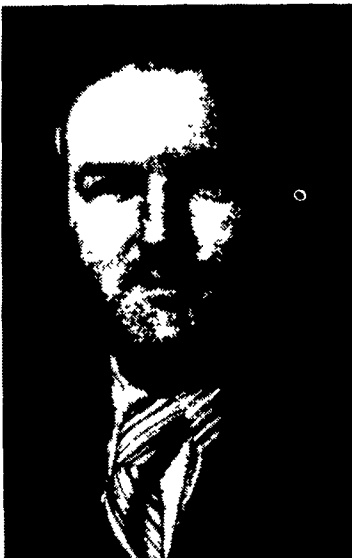
## Vegetables

Vegetable research is an important activity on the horticulture farm.

Dr. Ernest Bergman, professor of plant nutrition, is involved in the Penn State/South China Agricultural College program. He has brought back several varieties of vegetable crops that appear to

have a potential in Pennsylvania. One vegetable with good potential is Chinese Cabbage. Besides a trial with varieties from all over the world, is a nutritional study related to potassium and magnesium.

A graduate student of Dr. Bergman is conducting a pepper nutritional trial of 7 varieties with 3 levels of potassium and magnesium. Of special interest is their suitability in Pennsylvania as to earliness, fruit thickness, flowering, yield and nutrient content.



David Beattie  
Ornamentals

## Potatoes

Rock Springs is one of 10 potato demonstration research locations in the state where different varieties and lines are being tested. Some of the newer varieties you might be interested include: Penn 71, Buckskin, Pa 1, Yankee Clipper, Rosa, and Islander. Also included in this test by Dr. Richard Cole, professor of agronomy, are 88 lines from Penn State Research. There are also 37 regional selections for potato chipping-tablestock use, and 13 in the russet-long type variety trials throughout Pennsylvania in 1985.

You can see potato clones from the research of Dr. Paul Grun, professor cytology and cytogenetics (cell research) and his graduate student. There are primarily crosses of either Norchip or Katahdin by several South American species, and backcrosses to present North American varieties. This research is being done to develop improved potato varieties.

The horticultural facilities at Rock Springs serve as the farm office, laboratories, greenhouse, potting room, mechanics shop, and equipment storage.

Near the horticultural farm is an herb garden open to the public.



Lauren D. Tukey  
Fruit Research

## Greenhouses

Energy conservation in greenhouse production of flowers and vegetables is of great importance to the industry in Pennsylvania and there are several experimental greenhouses at Rock Springs. These have been equipped with solar heating units. However, under Pennsylvania conditions solar collectors have not been very effective because of cloudy conditions.

The most effective means of energy conservation has been the use of thermal blankets to create a false ceiling within the greenhouse retarding the out-flow of energy, and the use of double layer of glass or plastic as covering for the greenhouse. In addition, research is under way on varieties which tolerate lower temperatures, and



Larry Kuhns  
Ornamentals

on production systems in these greenhouses that enable satisfactory plant growth and production at lower energy levels.

## Ornamentals

Research is being done on container grown ornamental plants by Dr. David E. Beattie, professor of ornamental horticulture, and Dr. Larry J. Kuhns, associate professor of ornamental horticulture Extension. A pipe frame structure also serves for teaching various methods in ornamental crop production.

There is a small ornamental nursery as well as a small crabapple and American holly plantings for studying winter hardiness, diseases, and plant characteristics.

## Weed Control

It is possible to obtain total weed control in nurseries and Christmas tree plantations. Since bare soils create erosion problems, studies are under way by Dr. Kuhns to explore the use of various perennial cover crops that are easily managed and do not create pest and rodent problems. The ideal cover crop must establish quickly, grow slowly with little required mowing, and withstand heavy equipment during or shortly after a rain.

## Plant Breeding

Dr. Charles Boyer, associate



Ernest Bergman  
Vegetables

professor of plant breeding genetics, is studying the inheritance of fruit color in butternut squash, and is selecting for high yielding and high quality processing types. In other breeding work, he is continuing to develop extra sweet varieties of sweet corn with improved growth characteristics.

## Co-Cropping

Under evaluation at Rock Springs is co-cropping or intercropping of sweet corn and carrots. Co-cropping has importance in small farm situations and in third world countries where suitable vegetable land is limited.

There is a vegetable experiment to determine whether fall fumigation of the soil has any weed control potential. Dr. Peter Ferretti, associate professor of horticulture extension, is also investigating tunneling on peppers and melons as a method of enhancing early crop development in with plastic mulch.

Processing types of various summer and winter squashes are being evaluated for mechanical harvesting suitability. Fresh market types are being evaluated for early maturing and deep color. These are variety trials of broccoli, cauliflower, cabbage, peppers, pole beans, and processing tomatoes.

There are research plots of Dr. Orzolek, associate professor of Extension horticulture, studying the use of various gels as a soil anti-crushing agent for direct seeded tomatoes, fluid drilling research where growth regulators and fertilizers have been added to the gel-seed mixtures of tomatoes and peppers.

Other research is exploring the potential for the use of soil and foliar applied plant growth inhibitors on processing tomatoes. Several horticulturists and graduate students are involved in the innovative research being coordinated by Dr. Orzolek.

## Plant Nutrition

There are the research plots of Dr. Cyril Smith, professor of plant nutrition. Penn State is a leader in vegetable nutrition. Smith's studies include:

- the most effective source of phosphorus and its more efficient placement for tomatoes and sweet corn.

- tests on soils with a high lime requirement, the best rate over time (4.5 T/acre vs., 1.5T/acre yearly over 3 years),

- the effect of three different lime types on growth and yield of tomatoes, lima beans, squash, and cabbage, under different fertilizer treatments.

- studies on certain vegetable crops which have been shown to have different degrees of sensitivity to acid rain (tomato, snapbean and beet). Research is comparing the effect on limed and non-limed soils, under six different fertilizer treatments. Dr. Smith is seeking to find out why some crops are more productive than others when grown on unlimed soils.



Charles Boyer  
Plant Breeding



Paul Grun  
Potato Research