

Use of

## Cyclotron at Davis

### for tracer studies in agriculture

Construction, at Davis, of a 22" cyclotron capable of producing 12-Mev protons and 6-Mev deuterons will permit the beam from the instrument to be sent into the beta-ray spectrometer for the study of short-lived radioisotopes. The cyclotron also will produce some short-lived or neutron-deficient isotopes for tracer studies in some agricultural fields.—*C. G. Patten, Dept. of Physics, Davis.*

Control of

## Red Spider Mites

### resistant to standard miticides

During 1959 the Pacific mite on grapes showed increasing resistance to standard miticides. Research in progress is designed to determine whether the Pacific mite can be controlled by so-called silica aerogels. The silica aerogels are marketed as very small particles of silicon dioxide, chemically the same as common sand. The particles are very absorptive and absorb the fatty—lipoid—covering of insects, so affected insects lose water by evaporation and die of desiccation. Because of the way in which the aerogels kill insects, previously acquired resistance to DDT, parathion, and other insecticides will offer no protection from the effects of aerogels. Similarly, it appears that insects will not be able to develop resistance to aerogels because the action of the aerogels is mechanical. Whether the silica aerogels will act on the Pacific mite, and if so, what is the proper method of treating a vineyard, are under investigation.—*Leslie M. Smith, Dept. of Entomology and Parasitology, Davis.*

Root-knot nematode resistant

## Alfalfa Varieties

The development of alfalfa varieties resistant to three distinct species of root-knot nematode is the objective of research currently underway at Davis. In many cases poor stands and poor growth, especially on sandy soils, can be traced to nematode infestation. Any one of three distinct species: the northern root-knot nematode, the Javanese root-knot nema-

tode or the cotton root-knot nematode may cause the damage.

The first step in the research program was to find sources of resistance to all three species of nematodes. A survey of 280 different lots of alfalfa from many parts of the world revealed that only in the variety Vernal was there resistance to all three nematode species. The second step was to determine if this resistance would be effective against nematodes in all parts of California. Plants were tested against 24 collections of nematodes from various parts of the state. One plant was found that was resistant to all collections. The third step of the program was to determine how resistance was transmitted to the offspring of the resistant plant. The inheritance of resistance was found to be quite simple. The fourth and final step of the program is to transfer this resistance to adapted California varieties. The variety Vernal is not suited to hay production in California, so the resistant plant is being crossed and backcrossed to California varieties to transfer the nematode resistance.—*E. H. Stanford, Dept. of Agronomy, Davis.*

Skin pigments of

## Red Grape Varieties

The visual appeal of many table and of many wine grape varieties depends on the attractive red color of the anthocyan pigments present. Among the factors influencing the shade and intensity of the red color are the number and composition of the pigments in the grape and in the wine. The pigment patterns for approximately 170 vinifera grape varieties were determined. The number of pigment bands varies from two or three for several of the lightly pigmented table grape varieties to a normal maximum of eight bands for a large number of the vinifera varieties. The Pinot noir types have a standard four band pigment pattern. Major qualitative and quantitative differences in the observed pigment compositions within the general eight band pattern were observed for the many varieties investigated.

Hydrolysis of the pigments present in five of the bands resulted in the identification of the anthocyanidin portion of the pigments. Glucose is the only sugar cleaved from the anthocyanidins by the hydrolysis. The complete identification of the pigments present in all eight bands is under investigation. A thorough understanding of the chemical nature of the

anthocyan pigments in vinifera varieties will greatly facilitate investigations into the biosynthetic pathways by which pigments are formed in vinifera grapes. Complete knowledge of the nature of the pigments and the factors that control the development of the skin pigments in grapes are of extreme importance to geneticists in the development of new grape varieties with more desirable color characteristics. — *Richard E. Kepner, Dept. of Chemistry, and A. Dinsmoor Webb, Dept. of Viticulture and Enology, Davis.*

Decline and collapse of

## Lemon Trees

Intensive investigations of declining and collapsing lemon trees indicate that the disorder called lemon sieve-tube necrosis is a structural disorder. When certain lemon clones reach an age of three or four years, a deterioration of the sieve tubes begins. Only slight amounts of this deterioration are present at first. Eventually the deterioration becomes extensive and the tree declines as a result of girdling caused by the disease.

About the same time that work on lemon sieve-tube necrosis was in progress nucellar Eureka lemon trees were widely planted. In 1952, a reported evaluation for lemon sieve-tube necrosis of the lemon clones most commonly planted revealed that all of the clones of nucellar Eureka examined had early stages of the disorder.

In 1959 reports from growers that nucellar Eureka trees were declining severely led to a survey of lemon clone

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