Leaf water potential four to six days after an irrigation (1982)

Date	Leaf water potential
	kPa
August 2	−1260
August 17	−1290
August 30	−1240

wet spring of 1982 forced the grower to delay planting until May 1, a month later than the 1981 planting.

Significant differences in cumulative maximum evapotranspiration between 1981 and 1982 existed early in the season, but the difference in seasonal evapotranspiration between the two years was only about 8 percent of the total 1981 evapotranspiration (fig. 2). During the peak evapotranspiration period of July and August, daily rates were about the same in both years.

An evaluation of water content data of both years showed that the increase in irrigation interval resulted in greater soil moisture depletion. The average depletion in 1982 was about 94 mm (3.7 inches) whereas in 1981 it was about 71 mm (2.8 inches). Thus, even though differences in planting days and seasonal evapotranspiration occurred, soil moisture depletion was greater when the pressure chamber was used for irrigation scheduling.

We estimated the contribution of the shallow groundwater to the seasonal crop water use by comparing changes in the soil moisture in the root zone between irrigations with the total evapotranspiration for the same period. The difference between the two is considered the volume of water supplied by upward movement into the root zone. With an assumed root depth of 0.68 meter (27 inches) (based on measurement of the tap root), we estimated that the average contribution from groundwater was about 19 percent in 1981 and 25 percent in 1982. However, we believe that these differences are insignificant.

One aspect to be considered in irrigating under a saline high water table is that of adequate leaching to prevent salt accumulation in the root zone. We believe that pressure chamber measurements made four to six days after an irrigation can be used to detect any increase in the salinity level of the root zone. In 1982, soil moisture in the root zone was approximately the same four to six days after each irrigation in July and August; thus, any significant increases in pressure chamber readings throughout the summer would be due to increases in salinity (excluding any effects of day-to-day variation of climate). Measurements made four to six days after an irrigation showed no significant change in leaf water potential (see table). This would be expected for the short time during which we collected data, if no appreciable increase in soil salinity had occurred.

Since day-to-day variation of the climate, as well as the root zone environment, can affect leaf water potential, we compared pressure chamber readings with solar radiation, maximum daily temperature, average wind speed, vapor pressure between noon and 3:00 p.m., and soil water content. We found little correlation between pressure chamber readings and the climate data, but good correlation between leaf water potential and soil water content. Thus, any day-to-day climatic variation had a negligible effect, but soil moisture changes had a significant effect on leaf water potential.

We believe that the pressure chamber, coupled with the information developed by the other UC researchers, provides a practical means for scheduling irrigations in areas with a saline high water table. In this study, the irrigation interval was increased by about four days during the peak evapotranspiration period and the number of irrigations reduced by one. However, yield at this site was 1,078 kg per hectare (1.9 bales per acre) in 1981 and 1,281 kg per hectare (2.2 bales per acre) in 1982. In our opinion, this yield difference is in part due to the differences in irrigation scheduling.

The need to increase the intervals between irrigations at this site was contrary to what we had expected. Normally, intervals between irrigations under saline conditions should be smaller than those under nonsaline situations to minimize yield reductions. Since we were able to increase the interval, soil moisture rather than soil salinity may have been the controlling factor for scheduling irrigations at that location. Nevertheless, under traditional methods of scheduling at this site, the influence of soil salinity could not have been as readily evaluated.

There is much interest in the feasibility of irrigating with subsurface drainage water. A number of projects are being conducted in California to address this matter. Their main objective is to look at the relationship between crop yield and irrigation water quality. This relationship, however, may depend not only on the water quality, but also on the irrigation schedule. Adjusting irrigation frequency according to measurements of leaf water potential could make a difference in the effects of a particular quality of water on crop yield.

Sidney W. Kite is Farm Advisor, Cooperative Extension, Kings County, and Blaine R. Hanson is Drainage and Groundwater Specialist, Cooperative Extension, University of California, Davis.

The medfly crisis:

Little research has been done on risk evaluation: how risks are perceived, what psychological and social factors influence perception, and how individuals interpret the impacts of events with uncertain consequences. The Mediterranean fruit fly eradication program provided an opportunity to assess public attitudes toward technological risks. This is a case study of 126 residents from a metropolitan area south of San Francisco, who, at the time, were undergoing exposure to aerial spraying with a pesticide.

The target pest, Mediterranean fruit fly (*Ceratitis capitata*), infested a large portion of Santa Clara County, spreading into Alameda, San Mateo, Stanislaus, and San Joaquin counties. Using both attitude and behavioral assessments, we took the opportunity to study persons immediately exposed to a technological event of limited but unknown risk, which was generating considerable public debate.

Research on the perception of potentially hazardous technologies suggests that as the degree of exposure to, and experience with, specific hazards increases, risk perception decreases. These findings lead to the conclusion that for those living in hazard-prone areas, it is easier to change attitudes about living in potential risk situations than to change residences. Other data suggest that increased exposure to, or experience with, specific dangerous conditions may serve to reinforce indifference toward that condition, unless exposure has caused serious personal damage. Sex, age, and level of education have been valuable in predicting levels of risk perception. Generally women have a greater tendency toward risk avoidance than men. Younger subjects and those with higher education express greater concern over risk situations.

Acceptability of risks appears to be influenced by other factors, such as perceived benefit of technologies. High acceptability may also result when (1) one is better informed of the benefits of or has heard less about the risks of the event; (2) social traditions and norms

The public saw the benefits of medfly eradication as far exceeding the risks of exposure to pesticides

citizens' response to eradication risks

Glenn R. Hawkes □ Marc Pilisuk □ Martha C. Stiles □ Curt Acredolo

favor acceptance; (3) experts are considered substantively competent, using optimal strategies, and serving the participants' interests. Finally, whether or not exposure is voluntary influences acceptance.

The study

The aerial spraying of malathion in Santa Clara County resembled other events involving public assessment of risk. The concern expressed was with the efficacy and safety of the manner of eradication. Attempts to eradicate the medfly by stripping fruit from trees, quarantining infested counties, and dispersing sterile flies had been publicly criticized. Differences among and within governmental agencies, agribusiness, and technical experts and decisionmakers had been highly visible in the media and the situation was politically charged. In addition, aerial spraying of such duration had never been tried in populous urban centers, and long-term effects had not yet been adequately studied.

We selected the community of Milpitas, in the center of the infestation area, as the survey site, from which we drew a random sample. After a brief telephone interview to solicit cooperation and to determine eligibility, we sent a mail questionnaire. Of the 218 phone contacts, 141 (65 percent) agreed to receive the survey, and 126 (58 percent) actually returned a completed questionnaire.

The Milpitas sample was 52 percent female, and the median family income was $31,322. Median educational level of the respondents was 13.7 years; age ranged from 15 to 74 years; and they were predominantly white. Most (51 percent) described their political ideology as moderate, 26 percent were conservative, and 23 percent indicated they considered themselves liberal (or radical). The sample characterized itself as well informed about the situation and about the protective behaviors recommended to avoid exposure to malathion spraying.

Four dependent variables were measured: degree of perceived health risk, degree of perceived environmental risk, number of precautions taken, and degree of acceptability. We determined degree of perceived risk by asking to what extent the ground and aerial sprayings presented health and environmental dangers. We asked if aerial spraying (and again ground spraying) was of serious, moderate, slight, or no hazard to humans. The health risk scale was constructed by summing scores on these two items. Two similar items were used to build an environmental risk scale.

We constructed a behavioral response variable by summing the number of precautions taken, the nature of which would imply efforts to protect personal human health. It was presumed that the higher the number of precautions taken the greater the perceived risk. Questions were phrased as exceptions to the respondent's normal behavior (for example, "did you stay indoors but otherwise would not have").

To measure acceptability, two questions addressed the level of agreement with eradication methods, both aerial and ground. The acceptability scale was constructed by summing responses across these questions.

The questionnaire yielded information on a large number of potential predictor variables, such as sex, age, education, political ideology, and the presence of children. Experience with chemicals was elicited from a list of items regarding use of pesticides in four settings. Knowledge of pesticides was composed from items related to ability to identify chemicals used in past experience, poisoning symptoms, and self-rankings on level of knowledge. Total amount of spraying experienced was merely the sum of aerial sprayings that occurred until the survey ended.

Confidence in experts was measured by summing agree/disagree responses to three statements: (1) "Scientists and industry experts have done detailed studies on the health effects of pesticides." (2) "The information experts have is being used to protect the public from pesticide injuries." (3) "If used according to instructions and warnings on the labels, pesticides are completely safe for home use."

A significant media event was identified after reviewing the major newspaper, *San Jose Mercury-News*, from the date of the first spraying in Milpitas to the end of the survey period. During one two-day period (August 23-24, 1981) medfly coverage exceeded 1,500 column inches, almost four times the amount of exposure given before and after these dates. Responses to questionnaires completed before and after the event were compared.

Finally, a measure of perceived benefit was derived from "yes" or "no" responses by Milpitans to a question on whether the eradication decisions were made in their best interest.

Risk perception

We expected a perception of high risk, because subjects had little control over the spraying and its uncertain consequences. In addition, exposure to aerial application was involuntary. Only 35 percent indicated perceiving serious risks to humans from the aerial method, and only 40 percent felt there were serious dangers to the environment.

Behavioral response contrasted sharply with these expressions: 94 percent of the total sample took at least one precaution. Specific precautions were recommended to residents through the local news media and specially distributed flyers, and most precautions could be easily executed. Of the respondents, 64 percent said they stayed indoors, 73 percent closed windows and doors, and 50 percent washed objects exposed to spray.

As a subgroup, parents with children under the age of 12 took more precautions than the sample as a whole. For instance, 21 percent (parents) reported having left town to avoid aerial spraying, as opposed to 9 percent of the total; 75 percent stayed inside, as compared with 64 percent of the total; and over 4 percent used protective clothing, whereas only 2 percent of the total sample took this precaution.

The high proportion of those taking precautionary measures suggests that

participants actually perceived a greater health risk than they were willing to admit directly. On the other hand, the low frequency of expressed risk may reflect an assumption that protective measures were adequate to mitigate potential harm. This possibility suggests that risk perceptions must also be evaluated in the context of available safeguards.

Variations in perception

As in other studies, women tended to perceive a higher risk to health (30 percent) and environment (33 percent) than men did (18 and 26 percent, respectively), but this difference did not reach statistical significance in our sample. Also, as others have observed, younger respondents expressed a greater concern over health and environment than the older respondents, but not significantly so. Although a larger proportion of those with college degrees perceived the chemical uses as presenting a high environmental risk — an observation supporting prior studies on environmental concern — this difference did not reach statistical significance either. Thus, the effects of sex, age, and education were all in the expected direction but were not of sufficient magnitude to be regarded as reliable.

Even though experience with and knowledge of pesticides approached significance ($p < 0.10$) in influencing the perception of health risks, both were clearly nonpredictive regarding perceived environmental dangers. Greater perception of risk to health was associated with low experience and knowledge. The number of aerial pesticide applications experienced had virtually no predictive value in the present study.

Four factors were reliable predictors of health and environmental risks. Respondents with the least confidence in industry experts expressed the highest degree of perceived risk. Conservatives perceived the least risk in the spraying situation, and liberals perceived the most. The press had great influence: respondents questioned after the media event perceived considerably more environmental risk than those polled before the event. And finally, as expected, those believing the eradication program was beneficial expressed little worry about the attendant risks, compared with those seeing no benefit.

Each predictor was examined a second time with the influence of the other three first extracted through statistical procedures. All significant predictors of the perception of health risk (confidence in experts, political affiliation, and perceived benefit) continued to be significant and accounted for 24 percent of the variance in perception. Political ideology dropped out as a predictor of the perception of environmental risks when the regression analysis was completed. This result suggests that political ideology operates only indirectly in influencing the perception of environmental risk, perhaps by influencing confidence in experts and perceived benefit. The remaining three variables accounted for 23 percent of the variance in perceived environmental risk.

Acceptability of risks

Five variables reliably predicted acceptability of malathion spraying. Those expressing less confidence in experts indicated less acceptability, and liberals were less accepting than conservatives. Acceptability increased with higher perception of benefit. High health and environmental risks were associated with less acceptability.

When each predictor was re-examined with all other significant predictors extracted, only perceived health risk ($F[1,90] = 6.96$, $p < 0.01$) and perceived environmental risk ($F[1,90] = 4.326$, $p < 0.05$) were significant predictors. These results suggest that, in the present situation, acceptance was primarily influenced by one's opinion of the health and environmental hazards involved. Political ideology, confidence in experts, perceived benefits, and the media event all influenced risk acceptability by influencing perception of health risks. Nevertheless, both health and environmental risk perceptions contained variance unaccounted for by these other variables, and both remained predictive when all other predictors were statistically controlled. These two variables accounted for 30 percent of the variance in acceptability.

Influence over decisions

Finally, we considered the perceived influence of citizens on the decision-making processes. Respondents were asked to indicate the six most influential of nine agents and to rank them in order of influence: federal, state, county, and city governments, governments of other states, citizens within the infested counties, agricultural interests, environmental groups, and chemical companies.

On the average, citizens ranked themselves sixth most influential, indicating a low degree of power. Of the governmental agents, the federal government ranked highest, followed by the State of California, other states, and county government. Agricultural groups were the only special interests ranked in the top six, being third most influential overall. Environmental groups and chemical companies were not regarded as greatly affecting decisions.

Conclusions

The eradication program for the Mediterranean fruit fly provided an opportunity to assess citizens' attitudes toward the risks of technology, which appear to be affected by concern over the highly publicized political issues and confusion by experts. This was a first-time event in California, from which some important observations can be made.

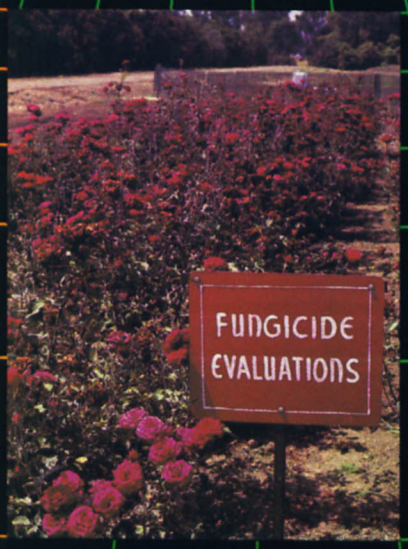
First, perceived risk cannot be measured independently of perceived benefits, and second, neither measurement should be attempted without first considering the context within which decisions relative to the risky activity are made. In this study, participants were asked to what extent the chemical usage was risky and if they benefited by it. Threat to personal safety from pesticides and the threat to the greater society (or economy) posed by the medfly itself (if pesticides were not sprayed) were the risks that respondents had to consider. The high acceptability in this case suggests the willingness of the exposed public to sustain certain risks, seen as mitigable through personal precautions.

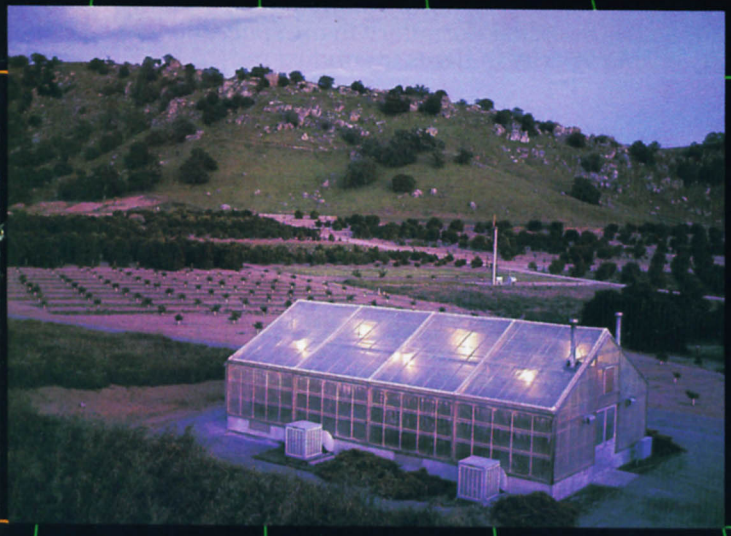
Subjects perceived the benefits of the eradication program as far exceeding the risks of exposure to pesticides. They also considered the infestation to be a major threat to the state's economy, which would negatively affect their well-being as well as that of the greater society. This, perhaps, explains the high degree of acceptability, even though citizens undergoing the aerial spraying ranked themselves low in influence on decisions.

Past research focused on attitudes toward use of pesticides and other hazardous substances. However, in-depth work is needed on the relationship between one's personal experience with such substances and one's perception of their risks and benefits. In addition, the mass abdication of control over circumstances with potentially harmful effects is attributable to more than an indoctrination and belief in democracy. Future studies in the area of risk assessment could lend valuable insight into individual decision-making acceptance of risks under various circumstances, and the perception of elected officials and industry experts.

Glenn R. Hawkes and Marc Pilisuk are Professors, Martha C. Stiles is Post-graduate Researcher, and Curt Acredolo is Research Psychologist, in the Department of Applied Behavioral Sciences, University of California, Davis. *The authors gratefully acknowledge the contributions of Gregg Nerase and Guy Whitlow. Funding was supplied in part by a grant from the California Department of Food and Agriculture (#1786) and by the UC Agricultural Experiment Station. A copy of the questionnaire may be obtained from the Department of Applied Behavioral Sciences, University of California, Davis, CA 95616.*

AGRICULTURAL FIELD STATIONS





University of California
Division of Agriculture and Natural Resources

In a state known for innovation in technology and business, agriculture remains California's largest, most dynamic industry. Each year the state's 82,000 farms and ranches produce nearly 250 agricultural commodities worth billions of dollars — an unparalleled array of fruits, vegetables, animal and dairy products, and ornamental plants for millions of consumers around the world.

Contributing to this productivity are the nine agricultural field stations maintained by the University of California throughout the state. The charge of these field stations, administered by the University's Agricultural Experiment Station under the Division of Agricultural Sciences, is to provide land, labor, and facilities to researchers in agriculture and to aid in public education in matters relating to agriculture and agricultural research.

With more than 70 years of achievement to draw upon, California's agricultural field stations are an essential part of the University's commitment to agriculture and to extension of the benefits of public research to every citizen.

The field stations range the length of the state, from Imperial Valley on the Mexico-California border, to Tulelake on the Oregon-California border. They are strategically situated in California's major climatic zones: the north and central coasts, the high mountain valleys and ranges of the Sierra Nevada, the arid regions of southern California, and the prolific Sacramento and San Joaquin valleys. Each station serves a unique set of local or regional needs and provides manpower, equipment, and facilities to fulfill all field and laboratory requirements for on-station basic or applied research.

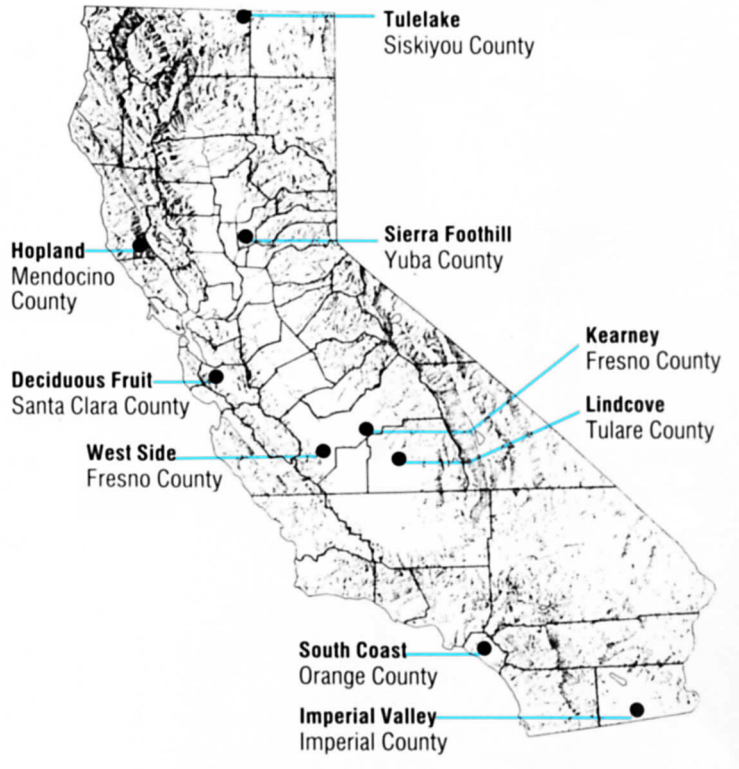
Field station research falls into two categories: basic research designed to probe the fundamental processes of organisms and their interactions with the physical world, and applied studies that translate into practical innovations to solve a wide variety of specific agricultural problems. The extraordinary range of crops and growing conditions represented in California makes the state an ideal laboratory for the development of solutions to agricultural concerns around the world, and the field stations attract thousands of visiting researchers and farm representatives each year.

Any scientist within the UC Division of Agriculture and Natural Resources may conduct a research project on a field station, provided the project is recommended by a research review committee, funding is available, and the station has space for the project. The hundreds of projects in progress at the nine stations range from long-term research to short-term experiments testing untried, creative approaches. In addition to University scientists, researchers from federal, state, and local agencies use field station facilities.

Cooperative Extension staff members play a major role in field station activities. Through Extension, research results are made available to other investigators, farmers, consumers, environmental groups, government officials, and the public.

Communicating the results of field station research can take the form of tours, seminars, lectures, bulletins, and

FIELD STATION LOCATIONS



public field days, providing visitors with a first-hand look a scientific work in progress. Numerous technical articles by researchers and project leaders are published as a result of field station work.

The field stations also serve as educational resources for students in agricultural sciences, providing "hands-on" learning opportunities through work-study programs and short courses. By providing dormitory living space, the University encourages its students to conduct research on the stations.

Collectively, the stations have 12,000 acres available for use and physical plant space of 335,000 square feet. A large inventory of farm equipment is available for research projects along with irrigation water, barns, pastures, range feedlots, laboratories, and laboratory equipment.

The main systemwide administration office for the nine Agricultural Field Stations is on the University of California Davis campus. Policies and procedures, fiscal and personnel matters, as well as physical plant construction and maintenance for all stations, are managed from this office.

The public may visit the field stations by making arrangements in advance with the Davis administrative headquarters. The address is: Agricultural Field Stations, University of California, Davis, CA 95616. Telephone: (916) 752-0126.

Harold R. Myers, Director
Agricultural Field Stations

Winter vegetable crops

Desert feedlot

Mixing experimental feed ration

Cereal grain trials

Weighing bok choy yields

Imperial Valley

The desert climate of southern California's Imperial Valley provides favorable conditions for growing many vegetable, grain, and field crops under irrigation. The field station at El Centro, only eight miles from the U.S.-Mexico border, is a highly diversified center for agricultural research, conducting studies in such areas as vegetable crop breeding and culture, irrigation management, soil salinity, improved varieties of grain and forage crops, and control of various insects and pests.

The station is a center for the national livestock feedlot industry. UC researchers use it to study beef and sheep feeding practices under low desert valley conditions, where summertime temperatures can reach 120°F.

In an area where average annual rainfall is less than three inches, research stresses development of optimal irrigation-fertilization strategies that will take full advantage of desert conditions.

Many of the projects at Imperial Valley are designed to improve grain varieties used for livestock feed. The station is a major germplasm testing point for various crops. In a recent year, over 1,100 rice lines from foreign countries were grown there under quarantine and increased for experimental purposes.

IMPERIAL VALLEY FIELD STATION
1004 East Holton Road
El Centro, CA 92243

(619) 352-0111

Research emphasis: Desert agriculture, field crops, alfalfa breeding, vegetable crops, livestock environmental and feedlot management, irrigation and drainage management

Size: 255 acres

Climate zone: Interior desert valley

Terrain: Flat alluvial plain below sea level

Average annual rainfall: 2.65 inches

Seasonal temperatures:
Annual mean: 72.6°F
Summer: Maximum monthly mean – 92.2°F
Winter: Minimum monthly mean – 53.6°F

Elevation: –60 feet

South Coast

The South Coast Field Station, 10 miles southeast of Santa Ana in Orange County, occupies 200 acres of former coastal desert in one of California's leading agricultural areas. It is a center for intensive research on fruits, vegetables, and ornamental plants, ranging from strawberries and avocados to tomatoes, citrus, turfgrass, nursery plants, and landscape trees. As one of the world's foremost strawberry research facilities, the station has been the site for development of many of the new high-yielding varieties released by the University.

Major research is done on the fruit that gave Orange County its name, with special attention to biological control of citrus insect pests. Environmental horticulturists use the facility to develop landscaping plants with increased vigor, resistance to pests and pathogens, and other desirable characteristics suited to southern California. Considerable effort is directed at tissue culture techniques for propagating genetically superior or disease-indexed fruit and vegetable plant materials. Numerous studies deal with pest and disease management.

Whitefly control test enclosures

Turfgrass irrigation trials

SOUTH COAST FIELD STATION
7601 Irvine Boulevard
Santa Ana, CA 92705-5997

(714) 559-4050

Research emphasis: Pest and disease management, citrus, avocados, strawberries, ornamentals, turf

Size: 200 acres

Climate zone: Coastal plain – temperate

Terrain: Medium sloped local alluvial fan

Average annual rainfall: 13.16 inches

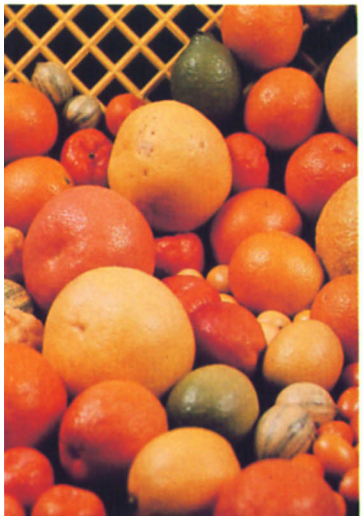
Seasonal temperatures:
Annual mean: 62.1°F
Summer: Maximum monthly mean – 71.4°F
Winter: Minimum monthly mean – 52.6°F

Elevation: 400 feet

Strawberry breeding

Pest management in tomatoes

Citrus pest control



Lindcove

The area of Tulare County where the Central Valley meets the gently rising western slopes of the Sierra Nevada provides an ideal environment for citrus research. Since it was founded in 1959, the Lindcove Field Station has played a major role in providing California growers with higher yielding, longer living cultivars, with resistance to pests and diseases that once threatened the citrus industry.

Two of the most important activities at Lindcove are maintenance of the Citrus Clonal Protection Program foundation block and distribution of disease-free planting stock. From a collection of over 400 citrus-indexed parent stock, tiny shoot-tip buds are excised and grafted onto specially conditioned seedlings in test tubes. Later regrafted onto a vigorous seedling rootstock and tested for diseases, the shoots provide budwood for certified disease-free citrus trees. About a quarter of a million certified buds have been provided to growers. Other research at this station is devoted to vegetable and tree fruit crops - small tomatoes, peaches, and plums.

LINDCOVE FIELD STATION
22963 Carson Avenue
Exeter, CA 93221

(209) 592-2408

Research emphasis: Citrus, stone fruits, tomatoes, pest management, frost control

Size: 175 acres

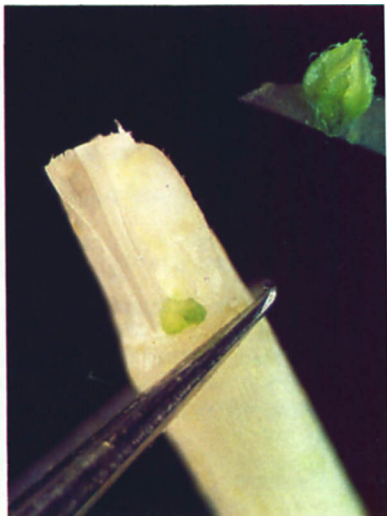
Climate zone: Interior valley modified by west slope of Sierra Nevada

Terrain: Medium to flat slopes

Average annual rainfall: 14.06 inches

Seasonal temperatures:
Annual mean: 63.9°F
Summer: Maximum monthly mean – 82.3°F
Winter: Minimum monthly mean – 46.6°F

Elevation: 450 feet



Shoot-tip grafting

Kearney

Situated in the geographic center of the fertile San Joaquin Valley, this research facility was formed in 1962 to serve the diverse agricultural industry of the Valley. It has since become internationally recognized for research that has resulted in new fruit, nut, and grape varieties, innovative irrigation practices, better pest and disease management techniques, and more efficient fertilization methods.

Grapes — for table use, wine, and raisins — are a high-priority research subject. Studies include the effect of smog on yield, development of new varieties, improved trellising systems, pest and disease control, and mechanical harvesting.

Stone fruits — peaches, plums, nectarines, cherries, avocados — are studied extensively. Various aspects of high-density fruit orchards, close planting of normal-size fruit and nut trees and development of high-yielding dwarfed trees are major projects. Other studies range from alfalfa and garlic to figs, olives, and vegetable crops grown in the Central Valley.

The UC Mosquito Research Laboratory is located at Kearney Agricultural Center. It is also headquarters for a number of Cooperative Extension specialists, and is a regional Cooperative Extension office.

Drying raisins

Grape flower-cluster thinning

High-density dwarf peach orchard

Portable field laboratory

KEARNEY AGRICULTURAL CENTER
9240 South Riverbend Avenue
Parlier, CA 93648

(209) 646-2794

Research emphasis: Grapes, stone fruits, pest management, nuts, irrigation management, plant disease

Size: 268 acres

Climate zone: Interior valley

Terrain: Flat alluvial plain from Sierra Nevada

Average annual rainfall: 11 inches

Seasonal temperatures:
Annual mean: 62.4°F
Summer: Maximum monthly mean – 80.6°F
Winter: Minimum monthly mean – 45.5°F

Elevation: 337 feet

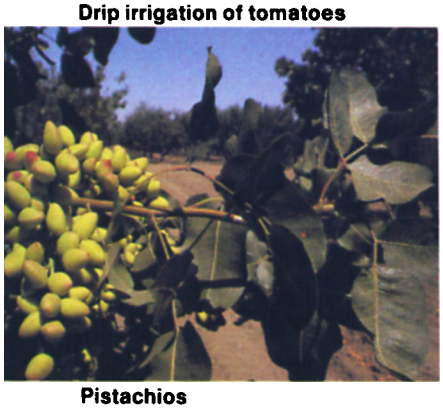
Short-season cotton

West Side

Large fields exceeding in size the station's 320 acres illustrate the scale of agriculture in the vicinity of West Side Field Station, one of two University research facilities serving the San Joaquin Valley. As in the Valley itself, research at West Side encompasses a great variety of fruit, vegetable, cereal, and fiber crops. The station is especially noted for cotton research. Nut crops — almonds, walnuts, pecans, and pistachios — are well represented in research plots. West Side is also a center for regional cereal grain trials. Yield and performance tests of wheat and barley provide data on new breeding lines and new and established varieties for comparison with other regions.

Vegetable crop research ranges from garlic to melons, asparagus, peppers, and tomatoes. Major attention is directed at improved alfalfa germplasm and breeding methods. Irrigation techniques for sugarbeets, drip irrigation for tomatoes, cotton, fruit trees, and other crops, and salinity control under high-frequency, low-volume irrigation are studied.

Drip irrigation of tomatoes



Pistachios

Regional cereal grain trials

WEST SIDE FIELD STATION
17353 West Oakland Avenue
(P.O. Box 158)
Five Points, CA 93624

(209) 884-2411

Research emphasis: Cotton, alfalfa, pest management, irrigation management, stone fruits, nuts, and vegetable crops, predator management

Size: 320 acres

Climate zone: Interior valley

Terrain: Flat alluvial plain from Coast Mountain Range

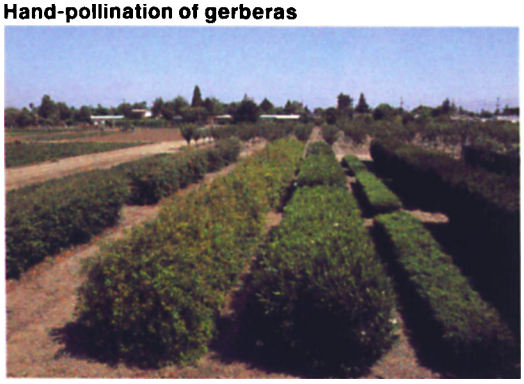
Average annual rainfall: 8 inches

Seasonal temperatures:
Annual mean: 62.2°F
Summer: Maximum monthly mean – 80.5°F
Winter: Minimum monthly mean – 45.2°F

Elevation: 285 feet

Hand-pollination of gerberas

Turfgrass plots



Landscape plants

Deciduous Fruit

The Deciduous Fruit Field Station in San Jose is the smallest, but one of the most heavily used agricultural research facilities in the University system. Its 17 acres serve scientists investigating fruits, cut flowers, turfgrass, vegetables, landscaping plants, berries, nuts, and biomass for energy.

From the time it was established in 1920, the station has contributed significantly to agriculture in the rich Santa Clara Valley. It is the northern center for research and development of strawberries, a major crop in the area. Now surrounded by the city of San Jose, it is one of the most frequently visited field stations.

In recent years research has focused on minimum irrigation, minimum-maintenance landscaping grasses, and plants for the urban environment.

DECIDUOUS FRUIT FIELD STATION
125 North Winchester Boulevard
San Jose, CA 95128

(408) 296-1672

Research emphasis: Deciduous fruits, ornamental plants, landscape management, pest management, strawberries, turf

Size: 17 acres

Climate zone: Interior coastal valley

Terrain: Flat alluvial plain

Average annual rainfall: 13.11 inches

Seasonal temperatures:
Annual mean: 59.4°F
Summer: Maximum monthly mean – 68.2°F
Winter: Minimum monthly mean – 49.2°F

Elevation: 60 feet

Master Gardener tomato trial

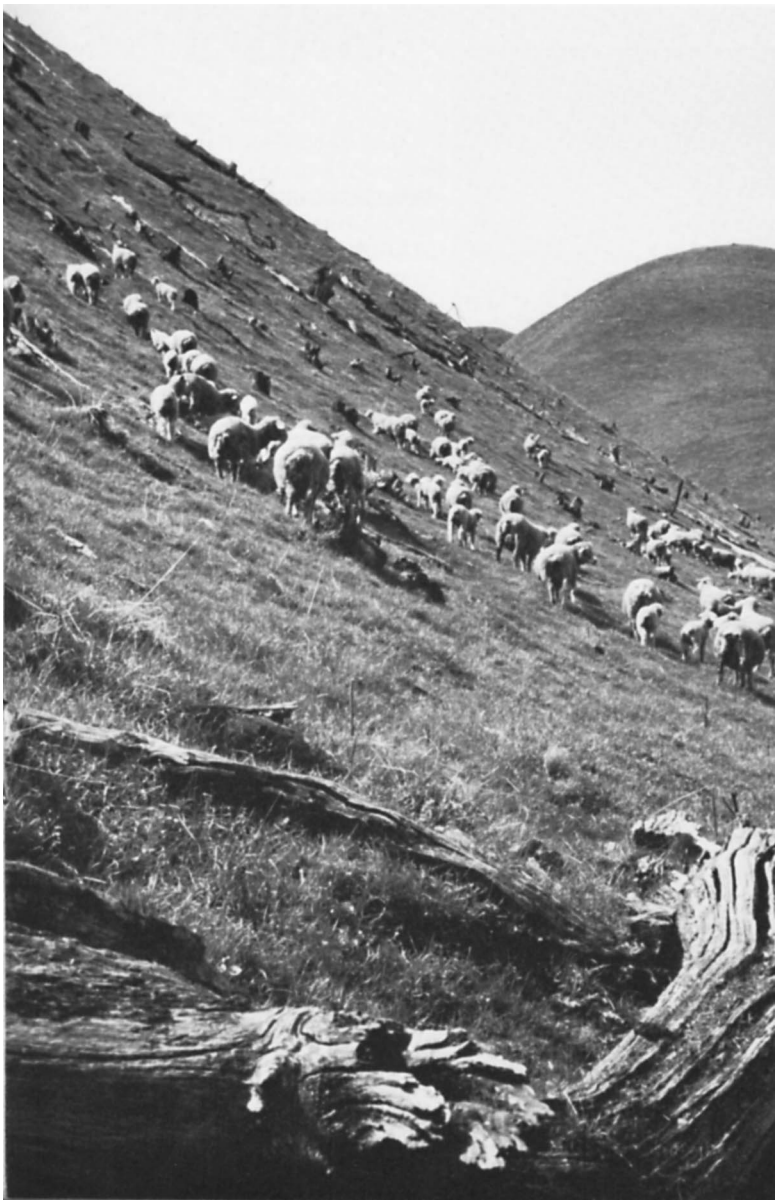
Fireblight control in apples

Hopland

The Hopland Field Station, in the brush-covered hills of the Coast Range 100 miles north of San Francisco, is the University's principal sheep research facility. Researchers use Hopland's substantial breeding flock of ewes to study the effects of pasture management on meat and wool production, to develop better breeds, and to improve survival of newborn lambs.

The station is the site of long-term studies on range improvement, brushland management, and watershed maintenance. More than 500 species of plants and 200 species of wildlife populate the hills, woods, and meadows that make up the 5,300-acre facility.

A captive population of coyotes is kept to test scent compounds used to help alleviate predation of sheep. A herd of 600 to 800 deer has provided valuable information on deer parasites and management practices beneficial to sport hunting.



Watershed maintenance

Irrigated rangeland

Wild coyote

HOPLAND FIELD STATION
4070 University Road
Hopland, CA 95449
(707) 744-1424

Research emphasis: Sheep breeding, nutrition, and management; range improvement, grazing management, sheep and wildlife pest management, predator management

Size: 5,358 acres

Climate zone: Interior coastal valley and foothills with hot, dry summers and mild, rainy winters

Terrain: Foothill rangelands with some small valley areas

Average annual rainfall: 36 to 45 inches

Seasonal temperatures
Annual mean: 59.2°F
Summer: Maximum monthly mean – 73.7°F
Winter: Minimum monthly mean – 45.9°F

Elevation: 500 to 3,000 feet

Rangeland fertilization

Sierra Foothill

A working cattle ranch until it was acquired by the University in 1960, the Sierra Foothill Range Field Station retains that atmosphere today. Most of the research conducted there is related to beef cattle. A herd of several hundred Herefords graze the rolling terrain typical of the region.

Experiments involve growth and development of calves, management systems for cattle and other livestock under foothill range conditions, animal nutrition, and causes and control of diseases and insect pests affecting range animals.

Researchers use the station to investigate management of open space; the effects of rangeland improvement on water quality, wildlife, and nutrient cycling; soil erosion; and the effects of irrigation on the productivity of pasturelands.

Erosion measurement

Gathering subclover seed

C^{14} nutrient infusion study

SIERRA FOOTHILL RANGE FIELD STATION
Peoria & Scott-Forbes Roads
(P.O. Box 28)
Browns Valley, CA 95918

(916) 639-2306

Research emphasis: Cattle breeding, nutrition, pest control and management, irrigated pasture and watershed management, rangeland improvement

Size: 5,720 acres

Climate zone: West slope of the Sierra Nevada foothills

Terrain: Small local valleys mixed with steep foothills

Average annual rainfall: 35.10 inches

Seasonal temperatures:
Annual mean: 60.4°F
Summer: Maximum monthly mean – 76.2°F
Winter: Minimum monthly mean – 44.8°F

Elevation: 600 to 2,500 feet

Barley improvement plots

Potato seed increase

Tulelake

Located on a former lakebed near California's northern border, the Tulelake Field Station provides facilities for research on cool-climate field and vegetable crops, especially potatoes, onions, small cereal grains, and alfalfa — crops important to local farmers and the agribusiness community of the region.

Many new varieties of potatoes have been developed and evaluated there. Cereal grain breeding, genetic, and production research have been conducted at the station for many years. New and improved varieties of durum wheat, common wheat, feed barley, and triticale have been developed at Tulelake.

Nearly half of Tulelake's acreage is used in the development of crops particularly suited to northern California. Wild horseradish growing in the area was developed into a commercial crop at the station, and the region now accounts for a third of total U.S. production of this crop.

Alfalfa variety trial

Cereal-grain research

TULELAKE FIELD STATION
Highway 139 & Havalina Road
(P.O. Box 447)
Tulelake, CA 96134

(916) 667-5117

Research emphasis: Potatoes, small grains, pest management, onions

Size: 118 acres

Climate zone: High mountain interior valley

Terrain: Flat organic soils – former lakebed

Average annual rainfall: 12.88 inches

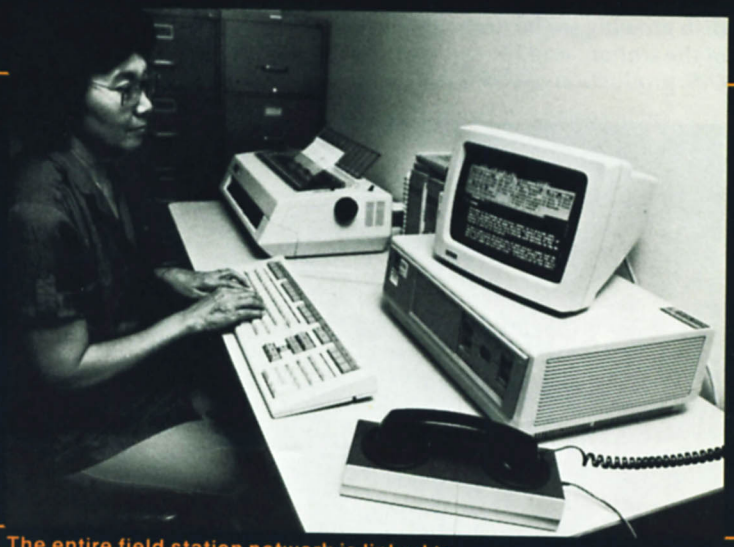
Seasonal temperatures:
Annual mean: 49.7°F
Summer: Maximum monthly mean – 73.0°F
Winter: Minimum monthly mean – 29.1°F

Elevation: 4,000 ft

Field station tours and demonstration days are popular ways for farmers and others to get a first-hand look at research in progress.

Each field station maintains a weather recorder. Some are highly sophisticated electronic units that are part of the official U.S. weather-reporting system.

All stations have well-equipped laboratories.



The entire field station network is linked to a central computer at the Davis headquarters.