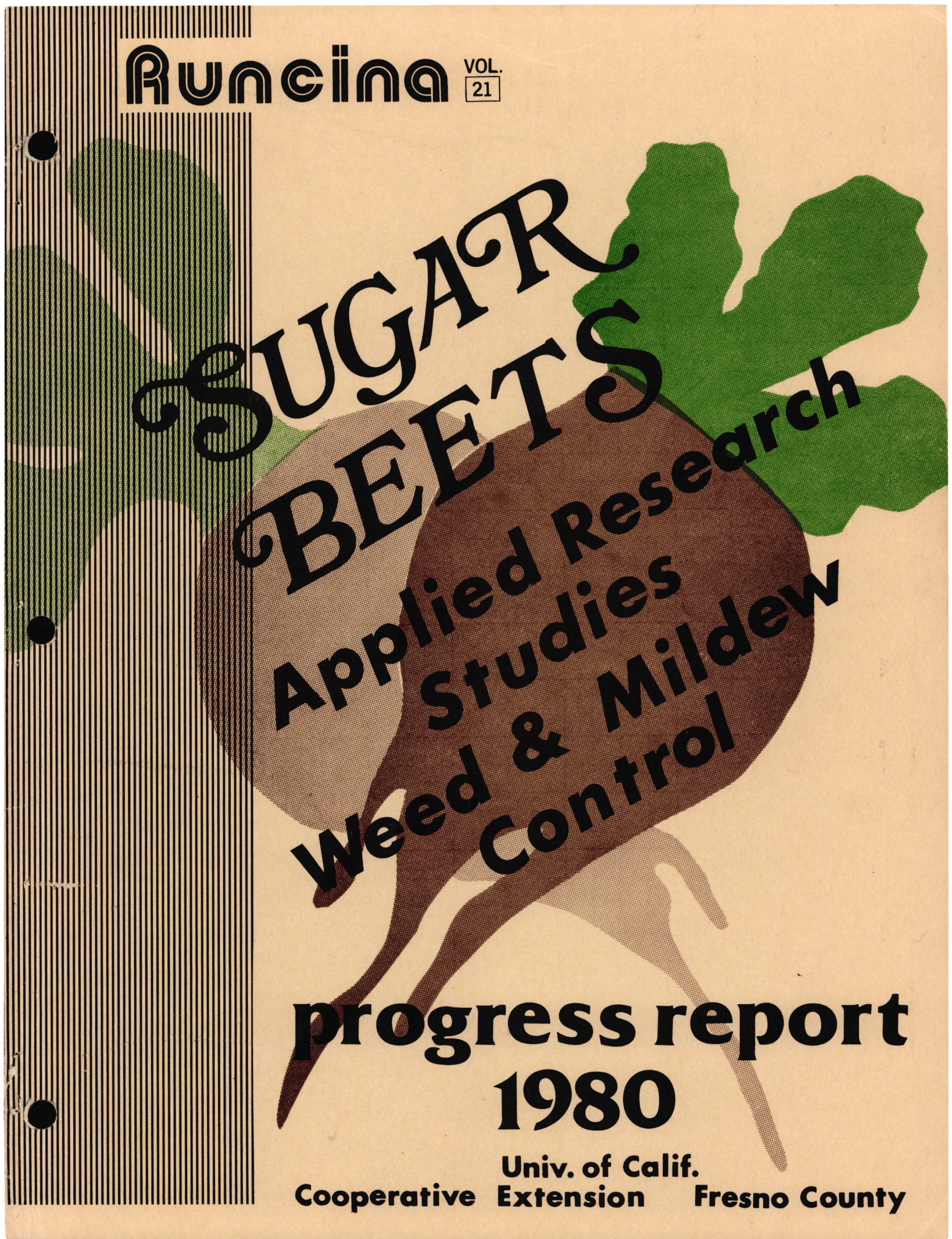
Runcina VOL. 21



SUGAR BEETS

Applied Research Studies Weed & Mildew Control

progress report 1980

Univ. of Calif.
Cooperative Extension Fresno County

This is a report of work in progress only. The chemicals and uses contained in this publication are experimental data and should not be considered as recommendations for use.

Until the products and their uses given in this report appear on a registered pesticide label or other legal, supplementary direction for use, it is illegal to use the chemicals as described.

WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in their original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Recommendations are based on the best information currently available, and treatments based on them should not leave residues exceeding the tolerance established for any particular chemical. Confine chemicals to the area being treated. THE GROWER IS LEGALLY RESPONSIBLE for residues on his crops as well as for problems caused by drift from his property to other properties or crops.

Consult your County Agricultural Commissioner for correct methods of disposing of leftover spray material and empty containers. **Never burn pesticide containers.**

PHYTOTOXICITY: Certain chemicals may cause plant injury if used at the wrong stage of plant development or when temperatures are too high. Injury may also result from excessive amounts or the wrong formulation or from mixing incompatible materials. Inert ingredients, such as wetters, spreaders, emulsifiers, diluents, and solvents, can cause plant injury. Since formulations are often changed by manufacturers, it is possible that plant injury may occur, even though no injury was noted in previous seasons.

To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.

The University of California Cooperative Extension in compliance with the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and the Rehabilitation Act of 1973 does not discriminate on the basis of race, creed, religion, color, national origin, sex, or mental or physical handicap in any of its programs or activities. Inquiries regarding this policy may be directed to: Affirmative Action Officer, Cooperative Extension, 317 University Hall, University of California, Berkeley, California 94720, (415) 642-0931.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture, James B. Kendrick, Jr., Director, Cooperative Extension, University of California.

COOPERATIVE EXTENSION
UNIVERSITY OF CALIFORNIA

County of Fresno
Farm and Home Advisors Office

1720 South Maple Avenue
Fresno, California 93702
Telephone: (209) 453-5931

ACKNOWLEDGEMENTS

This progress report was prepared to apprize the members of District 6 California Beet Growers Association of the applied research studies that were conducted with their generous support. I am especially greatful for the cooperation and encouragement of the Research Committee of District 6 CBGA.

The mildew control trial at the Westside Field Station was conducted cooperatively with Dr. F. J. Hills, Extension Agronomist. Jack's guidance and assistance are appreciated.

Without the cooperation and managerial assistance of many beet growers the trials summarized in this report could not have been conducted. Their assistance and unselfish cooperation are praiseworthy.

We wish to express our appreciation to Richard Hoover and Fred Fischer, University, California Westside Field Station; Norm Rianda, Ishmal Hobbs and George Guzman, Spreckels Ranch 41, for their salutary assistance and toil.

The herbicides and fungicides used in the experiments were furnished free by their respective manufacturers. Their generosity and cooperation is greatfully acknowledged.

Trade names of chemicals are used in this report; they are capitalized and are protected by the United States Patent Office. This progress report does not contain recommendations for the use of herbicides in sugar beet production.

BILL B. FISCHER
Farm Advisor

The University of California Cooperative Extension in compliance with the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and the Rehabilitation Act of 1973 does not discriminate on the basis of race, creed, religion, color, national origin, sex or mental or physical handicap in any of the programs or activities. Inquiries regarding this policy may be directed to: Affirmative Action Officer, Cooperative Extension, 317 University Hall, University of California, Berkeley, California 94720, (415) 642 0903

CO-OPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS, U.S. Department of Agriculture, University of California, and County of Fresno Co-operating.

INDEX

Page No.	
1	Introductory Remarks
1	Virus Diseases
2	Root Rot
3	Powdery Mildew
3	Residual Herbicides
5	Weed Control
7	Selection of Herbicides
7-11	IVM-Integrated Vegetation Management
Chart 1	Susceptibility of Weeds to Herbicides
Chart 2	Summary of Herbicide Performance, October - January
Chart 3	Summary of Herbicide Performance, February - June
12	Applied Research Studies 1980 - Weed Control
14-16	Preplant Incorporated and Preemergence Trials
17-20	Postemergence Weed Control Studies
21-25	Powdery Mildew Control Studies
Tables	
1 & 2	Weed Control-Preplant and Preemergence Trials
3-10	Weed Control Postemergence Trials
11	Weed Control Postemergence - Sequential Applications
12-14	Powdery Mildew Control Trial I - WSFS
15-16	Powdery Mildew Control Trial II - WSFS
17-19	Powdery Mildew Control - Firebaugh Trial

Trade Names, Common Names and Suppliers of the Herbicides Mentioned in this Progress Report

Trade Name	Common Name	Supplier
Antor	diethecine	Boots-Hercules
Betanal	phenmadipham	NorAm
Betanex	desmadipham	NorAm
Dowpon M	dalapon	Dow
Eptam	EPTC	Stauffer
Endothal	endothall	Pennwalt
Hoelon	diclofopmethyl	Hoechst
Nortron	ethofumesate	Fisons
Pyramin	pyrazon	BASF
Ro-Neet	cycloate	Stauffer
TCA	TCA	Dow
Tillam	pebulate	Stauffer

Experimental Compounds

Bayleton (Fungicide)	----------	MOBAY
CGA-64250 (Fungicide)	----------	Ciba-Geigy
KK-80	----------	ORTHO
POAST	----------	BASF
RO-13-8895	----------	MAAG

Sugar Beet Applied Research Studies-Weed Control-Mildew Control

A Progress Report - 1980

Bill B. Fischer, Lauren M. Burtch and Larry M. Brown*

We can count our blessings. Sugar beet yields are very good. The price of sugar is excellent. No serious or unexpected production problems were encountered. Harvesting of the 1979-80 crop is progressing well. The planting of the 1980-81 crop is underway.

However, to insure the continued profitability of growing and processing sugar beets in the central San Joaquin Valley, we need to heed a few warning signs. We observed many fields with increased virus diseases. Root rot was very serious in many fields harvested August and September and especially in fields with half-mile irrigation runs. Mildew is becoming more prevalent and more damaging. The growth of beets in many fields was adversely affected by residual dinitroaniline herbicides that were applied in the field to control weeds in crops preceeding sugar beets. Weed control in many fields could have been better, and in a number of fields it could have been accomplished at a lower cost.

It is somewhat comforting to know that reliable information and experimental data are available that can enable beet growers to avoid or prevent these problems from becoming widespread and more serious.

Virus Diseases

Virus diseases such as curly top, beet yellows, western yellows, and beet mosaic cannot be treated, but they can be prevented. With the preplant

*Farm Advisor, University of California Cooperative Extension, Fresno County; Chief Agronomist, Spreckels Sugar Division, Amstar Corporation, and Research Assistant, University of California Cooperative Extension, respectively.

application of Thimet (phorate) under the seed, curly top virus losses can, to a large degree, be prevented or certainly reduced.

The beet free periods worked out cooperatively among growers and processors have been very effective in minimizing virus yellows diseases. Nevertheless, it is extremely important to clean up volunteer beets and regrowth from pieces of crowns or small beets left in the field after the harvest. Seed producing bolters should be policed, eliminated; and weeds that may be hosts to the virus and the vectors in and around the fields should be controlled. The keys to a successful beet free program are sanitation, awareness, and prevention of a host build up.

Root Rot

Root rot is becoming a major problem, and it is a costly one. It can reduce yield and adversely affect sucrose percentage. Root rots significantly



Root rots - Erwinia on the left, wet root rot on the right - adversely affect yield, sucrose percentage, and significantly increase processing costs.

increase processing costs by reducing slicing capacity and sugar production in the factory. Root rot is very wasteful not only in terms of yield and quality reduction, but in energy utilization as well. Since rot normally destroys beets after they are grown, the fuel and effort expended in growing the root is wasted.

Varieties resistant to Erwinia root rot are available. Wet rot and rhizoctonia rot can be greatly minimized by improving cultural practices especially in regard to irrigation practices. Remember, rot can destroy the most resistant variety so prevention is the only dependable cure.

Powdery Mildew

Mildew in sugar beets was first observed in the central San Joaquin Valley during the 1974 growing season. Since that time it has become more widespread and damaging.

The adverse effect of powdery mildew on yield and quality was demonstrated in trials conducted in other areas of the state. A summary of the 1980 studies conducted in Fresno County is included in this progress report.

Prevention is the best cure for mildew control. Timely applications of sulfur at the first sign of the disease has been helpful. More effective fungicides are available; hopefully they will be registered for use in sugar beets in the near future.

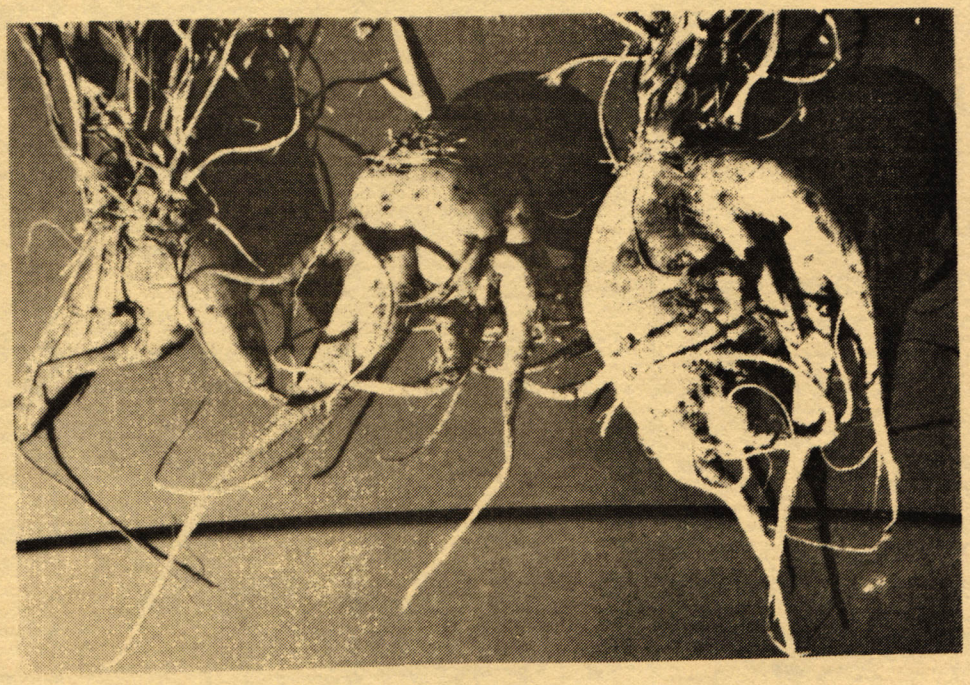
Residual Herbicides

An old timer, while observing beets being harvested, facetiously remarked ". . . . a young fellow new to farming or selling pesticides could assume that beets without twisted roots are abnormal."

Twisted root channels on a few beets can be observed in every field, and its cause is unknown. However, in many fields there is an excessive amount of it; and we know that it is caused by residual dinitroaniline herbicides such as Basalin, Prowl, Tolban and Treflan.



Young beets affected by dinitroaniline herbicides as compared with a normal root shown on the extreme left. Beets severely affected, as shown in the lower photograph, required more frequent irrigation to survive.



Their presence in small quantities can be detrimental to the survival and normal growth of young beets. Beets that survive in a severely affected field will need to be irrigated more frequently and harvested later.

The only cure is prevention. The cropping sequence has to be more carefully planned and the residual properties of herbicides used in crops grown in the field prior to planting beets must be considered.

Weed Control

Not too many years ago it was unusual to find a beet field that at harvest wasn't heavily infested with weeds, especially barnyardgrass. It would be desirable if the reverse would be true, and it would be unusual to find a weed infested field.

Unhappily, the fact is that in spite of the many effective mechanical and chemical tools that are available to beet growers, too many fields are weed infested at harvest. It is also true that many growers are spending more money for weed control than necessary.

A "blueprint" for more effective and less costly weed control could be prepared for every beet grower in central California. However, it would be misleading to minimize the importance of proper planning and timeliness of cultural operations in the use of the "blueprint".

Applied research studies have been conducted evaluating the use of selective herbicides on many soil types, under varied management and irrigation practices. Progress reports of these studies have been published nearly every year since 1967. Not one of the many selective herbicides available to beet growers will control all the weed species that may be found infesting beet fields. Therefore, to select the most effective herbicide or

combination of herbicides one must be able to identify the weed not only when mature, but in its seedling stage of growth as well. To use preplant or preemergence herbicides economically, it is essential to know what species of weeds are present in the field.



In spite of the many effective tools available for the control of weeds, there are too many fields that look like the ones shown in these photographs.



To help California farmers to identify weeds, colored pictures of commonly occurring weeds are available; and they can be purchased from the University of California.* Cards on which weed infestations can be recorded are available free from U.C. Cooperative Extension Offices, pest control advisors, and from distributors of herbicides.

Selection of Herbicides

To aid in the selection of herbicides, a chart listing the susceptibility of weeds to the herbicides evaluated in the applied research trials was prepared. Information summarizing the performance of herbicides in the trials conducted in the central San Joaquin Valley is available also.

Sugar beets in central California are planted from October through June. The weed spectrum varies within this period and the performance of herbicides are also affected by climatic conditions. Therefore, the summary of herbicide performance was prepared for beets planted from early October through January and a separate one for beets February through June. These charts are included following page 11.

I.V.M. - The Key

That integrated vegetation management (I.V.M.) is the key to profitable sugar beet production should be obvious to every grower and pest control adviser. Every management decision can have significant influence on every other necessary operation or event that occurs in the field. Advanced planning is essential, and it can be very profitable. However, plans must be flexible because many unforeseen things can occur beyond the

*Growers Weed Identification Handbook, University of California Agricultural Sciences Publications, 1422 Harbour Way South, Richmond, California 94804.

control of the best manager. When growing beets, or any other crop, we are dealing with biological systems that are dynamically interacting and continuously changing.

Growing beets in an integrated vegetation system means that we must endeavor to create or enhance conditions that are:

a. favorable for the growth of sugar beets,

b. unfavorable for the growth of unwanted competing vegetation,

c. unfavorable to the presence of destructive insects and diseases.

To accomplish this we must utilize all available knowledge and tools; mechanical, chemical, and biological.

Essential components of a viable integrated vegetation management system are:

Proper Field Selection. A grower through proper field selection can avoid planting beets in fields that are very high in salts, nitrogen, or heavily infested with perennial weeds or annual weeds that cannot be controlled with available selective herbicides.

Careful Cropping Sequence. Selective herbicides are widely used in the production of all crops. Only through carefully planned cropping sequences can a grower avoid injury to young beets that may be caused by small quantities of an herbicide that may remain in the soil beyond the harvest of the crop preceding sugar beets.



Only through careful field selection and proper cropping sequences can we avoid problems caused by residual herbicides as depicted in these photographs.



Adequate Land Preparation. Proper land leveling can promote efficient water application and minimize root rots. Good seed bed preparation can enhance the uniform germination of the beet seeds, rapid seedling growth, and the performance of preplant incorporated or preemergence herbicides.

Pre-irrigation and Timely Crop Irrigations. Irrigation of the field prior to planting is very desirable. It favors final seed bed preparation. Properly timed crop irrigations and short irrigation runs insure the uniform continuous growth of beets and minimize root rot.

Sanitation is a very important preventive control of weeds, insects and diseases. A grower can significantly increase yield, reduce the damage caused by insects and diseases, and minimize the cost of weed control by good sanitation practices on the farm. A beet grower must be especially aware of the necessity of controlling seedling beets and those that regrow from bits of the crown or small beets not gathered by the digger.

Weed Identification and Their Distribution. Beet growers depend on selective herbicides to control the unwanted competing vegetation in their crop. But effective, economical use of herbicides hinges on proper weed identification and knowing their distribution on the farm.

Proper Fertilization. Adequate fertilization is essential for the growth of sugar beets. A vigorously growing beet is a good competitor with weeds and they are more resistant to damage caused by diseases and insects. However, an excessive amount of nitrogen will reduce quality including sugar percentage; and it can enhance splitting of the crown leading to root rot.



Vigorously growing beets are good competitors with weeds, and they better resist damage from insects and diseases.

Insect and Disease Control is essential because beets are susceptible to numerous diseases and attacks by insects. Control measures such as sanitation, observation of beet free periods, insect predation, and the judicious use of insecticides and fungicides are important components of an integrated vegetation management system.

The Last Analysis

It may seem that every beet grower's objective is to produce maximum tonnage per acre that will have the highest possible percentage of sucrose. However, he can continue farming only as long as he can accomplish these profitably.

With the increasing cost of labor, equipment, fuel, and energy, every grower must carefully evaluate all aspects of production. Farmers who do this judiciously are practicing integrated vegetation management.

CHART I

SUSCEPTIBILITY OF WEEDS TO HERBICIDES FOR THE SELECTIVE CONTROL OF WEEDS IN SUGAR BEETS*

= Effectively Controlled
= Partially or Erratically Controlled
= Not Controlled
W = Winter Annual
S = Summer Annual
▽ = Perennial

		PREPLANT INCORPORATED				PREEMERGENCE SPRINKLER OR RAINFALL ACTIVATED				POSTEMERGENCE **										POST-THINNING ***	
		Pyramin	Pyramin + TCA	Ro-neet or Tillam	Pyramin + Nortron	Pyramin	Pyramin + TCA	Pyramin + Nortron	Nortron	Pyramin	Pyramin + dalapon	Betanal	Betanex	Betanal + Betanex	Betanex + dalapon	Endothal	Endothal + dalapon	dalapon	IPC	Eptam	Treflan
BROADLEAF WEEDS																					
Cheeseweed	W + S																				
Chickweed	W																				
Clover	W + S																				
Cocklebur	S																				
Cudweed	W + S																				
Dock Seedling	W + S																				
Fat Hen	S																				
Fiddleneck	W																				
Filaree	W																				
Flaxleaved Fleabane	S																				
Goosefoot	S																				
Groundcherry	S																				
Groundsel	W																				
Henbit	W																				
Knotweed	W + S																				
Lambsquarter	S																				
London Rocket	W																				
Marsetail	S																				
Miners Lettuce	W																				
Monolepis	W + S																				
Mustard	W																				
Nettle	W																				
Nightshade	S																				
Pigweed	S																				
Pineapple Weed	W																				
Popcorn Flower	W																				
Prickly Lettuce	W + S																				
Puncture Vine	S																				
Purslane	S																				
Red Maids	W																				
Russian Thistle	S																				
Shepherd's Purse	W																				
Sow Thistle	W + S																				
Speedwell	W																				
Spotted Spurge	S																				
Tolguacha	▽ S																				
Wild Radish	S																				
GRASSY WEEDS																					
Annual Bluegrass	W																				
Barnyardgrass	S																				
Bromegrass	W																				
Canarygrass	W																				
Crabgrass	S																				
Feather Fingergrass	S																				
Fescues	W																				
Foxtail (Bristlegrass)	S																				
Johnsongrass (Seed)	S																				
Lovegrass	S																				
Nutsedge	▽ S																				
Rabbitfootgrass	W																				
Ryegrass	W																				
Sandbur	S																				
Volunteer Cereals	W																				
Wild Barley	W																				
Wild Oats	W																				

** Effective when weeds are treated in their seedling stage of growing.

*** Effective when applied before weed emergence

* This chart is tentative, based on experiments conducted in the Central San Joaquin Valley. Proper timing and accurate application is imperative.

CHART #2 Summary of Herbicide Performance in Sugar Beet Trials
Planted October-January in the Central San Joaquin Valley

Method of Application	Herbicide	Conditions That Resulted in Most Effective Control	Conditions That Resulted in Poor Control or Injury
Preplant Incorporated	Pyramin®	Broadleaf weeds. Mild temperatures, with good growing conditions.	Cold temperatures and poor growing conditions can cause beet stand reduction. When grasses predominate.
	Pyramin® + TCA	Broadleaf weeds and fine grasses. Mild temperatures, with good growing conditions.	Cold temperatures and poor growing conditions. Volunteer cereals or wild oats present.
	Pyramin®+ Nortron	In winter planted fields when volunteer cereals and broadleaf weeds are present. Mild temperatures and good growing conditions.	Cold temperature and poor beet growing conditions. Ryegrass is present.
	Nortron®	When volunteer barley, wheat and/or wild oats were the only weeds present.	When other than volunteer wheat or barley were present.
Pre-Emergence	Pyramin®	In pre-irrigated fields. Broadleaf weeds and good growing conditions. Under sprinkler irrigation or rainfall.	Poor beet growing conditions and where more than 2 inches of water applied per sprinkler set. When grasses predominate.
	Pyramin®+ Nortron	In pre-irrigated fields. Broadleaf weeds, volunteer cereals and good growing conditions. Under sprinkler irrigation or when at least ½" rainfall occurs prior to the crop and weed emergence.	Poor beet growing conditions and where more than 2" of sprinkler irrigation applied per set prior to stand establishment. Where ryegrass or barnyardgrass are present. Where no rainfall occurs and furrow irrigation is used.
	Pyramin® + TCA	In pre-irrigated fields. Broadleaf weeds and fine grasses. Under sprinklers or rainfall and good growing conditions.	Poor growing conditions and where more than 2 inches of water applied — crop injury may result. Volunteer cereals or wild oats present.
Post-Emergence	Pyramin® + surfactant	Seedling mustards growing vigorously.	Broadleaf weeds other than mustards and grasses.
	Pyramin® + dalapon + surfactant	Seedling broadleaf weeds and grasses growing vigorously, when residual activity desired.	Moisture-stressed weeds. Weeds beyond their seedling stage.
	Betanal®	Vigorously growing seedling broadleaf weeds, except pigweed.	When grasses and pigweeds are present and residual control is desired. Application above 80°F may result in injury if applied before 3 p.m.
	Betanex®	Vigorously growing seedling, broadleaf weeds, except swamp smartweed.	When grasses, swamp smartweed or knotweed are present. Application above 80°F may result in injury if applied before 3 p.m.
	Betanex®+ dalapon	Vigorously growing winter and summer annual broadleaf weeds and seedling grasses except swamp smartweed.	When volunteer cereals are present. Weeds stressed for moisture and when beyond their seedling stage. Inury may result is applied earlier than 3 p.m. when temperature is above 80°F.
	Betanal®+ Betanex®	Vigorously growing winter and summer broadleaf annual weeds including pigweed	When grasses are present. Application when temperature exceeds 80°F injury may result when applied before 3 p.m. When weeds are stressed for moisture.
	Endothal®	When fiddleneck and/or swamp smartweed were the only weeds present.	When weeds other than fiddleneck and/or swamp smartweed were present.
	Endothal® dalapon + surfactant	Volunteer wheat, volunteer barley, or wild oats. When temperature was below 70°F.	Broadleaf weeds, ryegrass, or canarygrass.
	IPC	Canarygrass or volunteer cereals and wild oats under sprinkler irrigation or if ½" rain occurred soon after treatment.	Broadleaf weeds. Fields not irrigated within 24 hours of application. Erratic on volunteer Mexican wheat.
	dalapon + surfactant	Temporary control of grasses desired.	Broadleaf weeds present.
Post-Thinning Soil Incorporated	Treflan®	Summer annual grasses, pigweeds, and lambsquarters. After thorough soil incorporation into cleaned fields.	When resistant weed species predominated. When soil incorporation was poor.
Post-Thinning Injected into Irrigation Water	Eptam®	Injected into irrigation water. Summer annual grasses and broadleaf weeds before germination. When weeds resistant to Treflan® predominated, including nutsedge. Repeated application was essential.	Where wild sunflower or cocklebur predominated. Poor water distribution and poor subbing of the beds. Weeds established at the time of treatment. Timely follow-up treatment not made.

CHART #3 Summary of Herbicide Performance in Sugar Beet Trials
Planted February-June in the Central San Joaquin Valley

METHOD OF APPLICATION	HERBICIDE	Conditions That Resulted in Most Effective Control	Conditions That Resulted in Poor Control or Injury
PREPLANT INCORP-ORATED	Roneet® or Tillam®	Summer annual broadleaf weeds and grasses in well prepared seed bed, free of clods. In nutsedge infested fields.	In fields where mustards and London rocket predominate. Poorly prepared cloddy seed bed.
POST-EMERGENCE	Betanal®	Vigorously growing winter and summer annual broadleaf weeds except pigweed.	When pigweeds and Russian thistle predominated and grasses were present. When temperature exceeded 80°F, injury resulted if applied before 3 p.m.
	Betanex®	Vigorously growing winter and summer annual broadleaf weeds except swamp smartweed.	When grasses, swamp smartweed or knotweed are present. Injury may result if applied earlier than 3 p.m. when temperature is above 80°F.
	Betanex® + dalapon	Vigorously growing seedling, broadleaf weeds and seedling grasses, except swamp smartweed.	When volunteer cereals are present. Weeds stressed for moisture and when beyond their seedling stage. Injury may result if applied earlier than 3 p.m. when temperature is above 80°F.
	Betanal® + Betanex	Vigorously growing winter and summer annual broadleaf weeds, including pigweed and swamp smartweed.	When grasses are present. Application when temperature exceeds 80°F inury may result when applied before 3 p.m. When weeds are stressed for moisture.
	Pyramin® + dalapon + surfactant	Seedling mustard species and other winter annuals are present. Volunteer cereals and grasses except barnyardgrass.	Summer annual broadleaf weeds and barnyardgrass are present. Rising temperatures and low soil moisture.
	endothal + dalapon + surfactant	When volunteer barley or wheat predominate and temperature is below 70°F.	When broadleaf weeds and grasses other than volunteer cereals are present.
POST-THINNING, SOIL INCORP-ORATED	Treflan®	Summer annual grasses and broadleaf weeds — except resistant species. Thoroughly incorporated into clean fields.	When resistant species of weeds predominate. When soil incorporation is poor.
POST-THINNING INJECTED INTO IRRIGATION WATER	Eptam®	Injected into irrigation water prior to weed emergence. Broadleaf weeds resistant to Treflan including nutsedge. Repeat application essential.	When cocklebur and wild sunflower predominate. Poor distribution of irrigation water and poor subbing. Weeds established at time of treatment. Timely follow-up treatment not made.

Applied Research Studies 1980
A Progress Report

During the 1979-80 sugar beet growing season, emphasis was placed on the evaluation of newly introduced herbicides for the postemergence control of grasses and the evaluation of fungicides for the control of powdery mildew. A summary of the mildew trials is presented on pages 21 through 25.

Weed Control Trials

Studies were conducted to evaluate the susceptibility of different species of summer and winter annual grasses, including volunteer cereals, at different stages of their growth, to three experimental herbicides. They were evaluated also in combination with postemergence broadleaf weed killers and in sequential applications. Careful observations were made of their effect on the growth of sugar beets.

Trials were also conducted to study the comparative performance of several soil active herbicides when applied preplant and preemergence. Emphasis was placed on the evaluation of Antor (diethecine) alone and in combination with other herbicides.

Different methods and depths of incorporation were used to study the performance of several herbicides. However, in the trial area the weed population was too low for proper assessment of the treatments. Therefore, this study was not completed.

It is essential to know the residual properties of herbicides before their use can be recommended. A trial was established to study the residual properties of several herbicides that are used in sugar beet production or in crops grown in rotation with beets. This study will be summarized in a separate report.

Procedures U ed in Conducting the Tri ls

Trials were conducted at the West Side Field Station, Spreckels Farm 41 and several other locations with cooperating growers. All of the trials were replicated three or four times in randomized block designs.

The herbicides were applied with CO_2 constant pressure sprayers. In the preplant trials, they were incorporated with commercial type power driven rotary tillers to a depth of 2 to 2½ inches.

To evaluate the performance of herbicides and their effect on sugar beets, visual assessments were made several times. In some trials, stand counts were also taken.

To assess the relative performance of the herbicides, their effect on sugar beet vigor, or the injury that may have been caused by them, a rating scale of "0" to "10" was used. The system can be briefly summarized as follows:

Weed Control: "0"=no weed control, "10"=perfect weed control. A rating of 8 or above would be commercially acceptable weed control.

Beet Injury: "0"=no beet injury, "10"=very severe injury-death. Injury rating above "3" would not be commercially acceptable. However, herbicides may cause temporary retardation in the growth of young beets or they may cause scorching or deformity of the leaves. These symptoms can be short-lived and do not adversely effect subsequent growth and quality. Therefore, it is essential to make more than one evaluation.

Vigor Rating: "0"=very poor vigor, "10"=vigorously growing beets. A vigor rating of 8 or lower is not acceptable. However, some

herbicides may cause temporary reduction in vigor that will not adversely affect yield or quality

The location of individual trials, the soil type, irrigation method used, dates of herbicide application, and other relevant information are given in Tables 1 through 11 that summarize the results of the trials. Yield data were not obtained from the weed control trials.

What Have We Learned?

Preplant and Preemergence Studies

Growers have experienced erratic weed control with the use of Nortron applied preemergence. In a trial conducted at the West Side Field Station, the performance of Nortron and other herbicides were compared when preplant incorporated and applied on the surface of the soil (preemergence). In some treatments, the sprinkler irrigation was delayed six days following the application of Nortron. The evaluation of this trial is summarized in Table 1.

A second preplant incorporated trial, where the herbicides were applied on a cloddy seed bed, is summarized in Table 2.

- Roneet incorporated in a well prepared seed bed, free of large clods, provided effective broadleaf weed and grass control.

- Roneet + Extender was not more effective than Roneet without the extender.





To obtain effective weed control with Roneet, a well prepared seed bed, as shown on the right, is essential. No preplant or preemergence herbicides will provide effective control in a cloddy soil such as the one shown on the left.

- Roneet failed to give adequate control when applied on cloddy soil even though it was incorporated with power driven rotary tiller. See Table 2.

- Roneet + Nortron, evaluated in one trial, on cloddy soil did not provide more effective weed control than Nortron alone. However, the control was somewhat better than in the areas treated with Roneet.

- Nortron controlled volunteer barley more effectively when preplant incorporated than as a preemergence application, see Table 1.

- Delaying irrigation six days following the preemergence application of Nortron did not reduce its effectiveness on Panoche clay loam soil.

- Nortron did not provide adequate barnyardgrass control at 3.0 lb ai/A, see Table 2.

- Antor plus Nortron whether preplant incorporated or applied preemergence provided the most effective weed control.

- Antor plus Nortron effectively controlled the weeds when applied on cloddy soil, incorporated and furrow irrigated, see Table 2.

- No significant differences were observed between the performance of the two formulations of Antor (Antor A, Antor B). However, neither one controlled volunteer cereals.

- The combination of Antor plus Pyramin gave effective barnyardgrass and broadleaf control.

To Sum Up

Unfortunately, we are not wiser in knowing why some growers fail to obtain effective weed control with Nortron used preemergence. Additional studies need to be conducted to endeavor to learn the cause of these costly failures.

Again, it was demonstrated that to obtain effective weed control with Roneet a well prepared seed bed, free of clods, is essential.

Antor is a very promising herbicide for the control of annual grasses and certain summer annual broadleaf weeds. It is envisioned that upon its registration, Antor will be used in combination with Nortron or Pyramin. Its superior performance to Roneet on cloddy seed beds and its effectiveness when used preemergence warrant further evaluation. It would be desirable to study the performance of Antor applied broadcast and disk incorporated prior to listing.

Postemergence Studies

The need for an effective postemergence herbicide for the control of annual grasses including volunteer cereals is urgent according to many beet growers in central California.

To fulfill this need, fourteen trials were conducted evaluating three newly introduced herbicides; POAST (BAS-9052), RO 13-8895, and KK-80. Their effectiveness on summer and winter annual grasses including volunteer cereals at different stages in their growth were studied. They were also evaluated in combination and in sequential applications with Betanal and Betanex, two broadleaf herbicides.



Excellent grass control was obtained with postemergence application of Poast, RO-13-8895, and KK-80.

Early in the season it was requested that we discontinue the evaluation of KK-80. Therefore, in most trials, only POAST and RO-13-3895 were used.

POAST and RO-13-8895 were used in combination with the spray adjuvant PACE (83% parafin base petroleum oil and 16% surfactant bland) or X-77 except when they were mixed with Betanal and Betanex.

The results of these trials are summarized in Tables 3 through 11. The observations and evaluations can be briefly outlined as follows:

- All three herbicides; POAST, RO-13-8895, and KK-80 effectively controlled all summer and winter annual grasses including volunteer cereals except annual bluegrass.

- Sugar beets exhibited very good tolerance to all three herbicides when treated at different stages of their growth, ranging from 2 to 6 pairs of true leaves.

- Young vigorously growing grasses were more effectively controlled than the more mature ones or those that were tillered.

- Pace in some trials provided somewhat better early grass control and less beet injury, see Tables 8 and 11. However, in the



The combination of Betanal or Betanex with POAST, RO-13-8895 or KK-80 effectively controlled the broadleaf weeds and grasses except annual bluegrass.

final evaluations these differences were not significant.

- Combinations of the grass herbicides with Betanal plus Betanex provided excellent broadleaf weed and grass control. However, injury to the sugar beets was also more pronounced.

- Injury to the young beets was less severe, from combinations of Betanal plus Betanex and the grass herbicides, when applied during cool temperatures, see Tables 4-A, 4-B, 8, 9, and 10.

- In some trials, beets with less than 4 true leaves were killed when treated with mixtures of the grass and broadleaf herbicides when the temperature was 76^{o}F or above, as shown in Tables 6 and 11.

- Sequential applications may cause less severe injury to the beets, see Table 11.

- In sequential applications, Betanal plus Betanex may have to be applied first to obtain good broadleaf control, especially if pigweeds are present.

- Timing of the applications relative to the growth of the beets and weeds will be critical in obtaining maximum weed control with minimum injury to the beets.

- Under favorable growing conditions, beets recovered from the injury within two weeks. However, early treatments, before the beets had at least two pairs of true leaves, resulted in the reduction of the stand.

To Sum it Up

POAST and RO-13-8895 are very promising selective grass herbicides. Their registration for use in sugar beets could greatly benefit farmers in

central California. However, additional trials will need to be conducted regarding timing of application especially when used in combination with Betanal plus Betanex.

It is well known that Betanal plus Betanex can cause injury to the beets if used prior to 3 p.m. on days when the temperature exceeds 75°F. The addition of POAST or RO-13-8895 to Betanal plus Betanex tends to increase the injury. Therefore, additional studies are needed to determine timing of application in relation to the growth of beets and the ambient temperatures.

In many studies during the past decade, it was demonstrated that injury caused by postemergence herbicides to seedling beets did not adversely affect the yield. Nonetheless, yield data needs to be obtained in future studies.

Powdery Mildew Control Studies

In Retrospect

Powdery mildew in sugar beets has become an economically damaging disease problem in California since 1975. The disease is caused by Erysiphe poligoni D.C. also known as Erysiphe betae (Vanha). This fungus appears to be specific to sugar beets, swiss chard, red table beets, and wild beets.

Powdery mildew generally appears in fields when the beets are growing vigorously and their foliage nearly covers the area between the rows. In Fresno County, this may occur as early as March, on beets planted in the fall or winter.

The first sign of the disease is small, white or grayish powdery areas, usually on the underside of fully expended or mature leaves. The fungus filaments (mycelium) grow rapidly and cover both surfaces of the leaf blade. It sends root-like structures (haustoria) into the cells of the leaf tissue to obtain nourishment. Spores (conidia) that are not sexual are produced in abundance on the outside of the leaves giving it a powdery, grayish white appearance.

Powdery mildew is favored by the warm dry climate prevalent in central California. The optimum temperature for its growth is between 68° and 80°F. As the leaves grow older, they seem to become more susceptible; perhaps that is why it is not seen on seedling beets or on young plants.

In trials conducted at Davis, it has been demonstrated that powdery mildew, if uncontrolled, can result in yield losses ranging from 20 to 35 percent.

This is probably due to loss of efficiency of the leaves to synthesize sugars and to their premature death.

At the present time, sulfur is the only material registered for use in sugar beets to control powdery mildew. Jack Hills, Extension Agronomist, summarized control measures with sulfur as follows:

1. Start treatment at layby or at first sign of disease. In the Imperial Valley start treatment no sooner than at first sign of mycelium and before 40% MLAD (mature leaf area diseased).

   At layby: Ground application, 20 pounds of sulfur dust or wettable or flowable sulfur in 25 gallons per acre. The better the coverage, the better the control.

   At first sign: By air, 20-40 pounds sulfur dust or 10 pounds wettable or flowable sulfur in at least 10 gallons per acre.

2. Repeat the first application at three to six week intervals if disease reappears (e.g. greater than 20% MLAD).

3. Keep disease controlled to within two weeks of any harvest before October 1 but not after October 1 for a late fall harvest or for over-wintered beets.

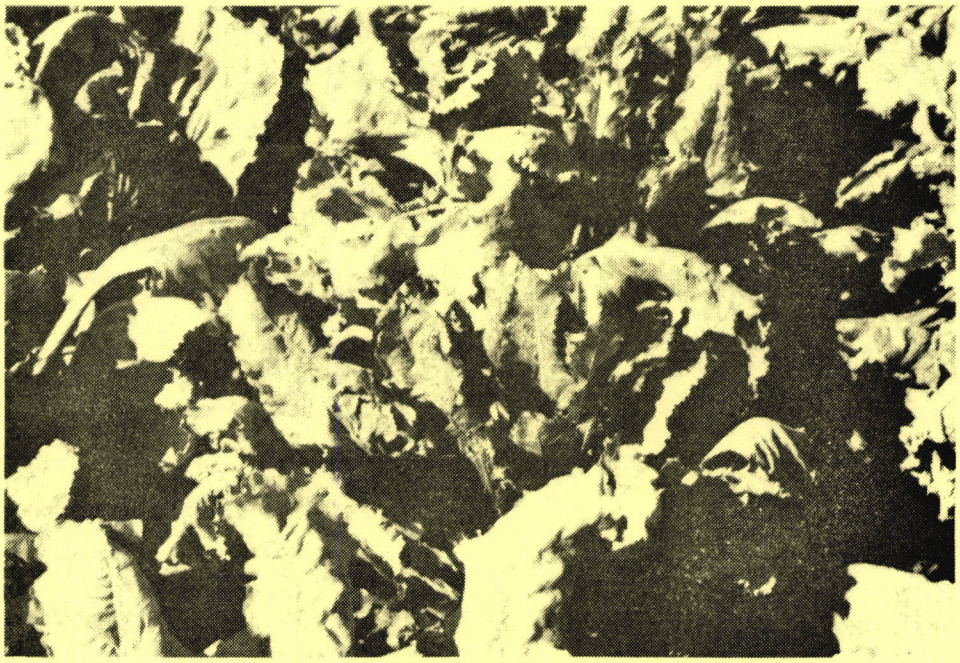
During the 1980 growing season, trials were conducted to study the affect of powdery mildew on sugar production in Fresno County and to evaluate the effectiveness of two systemic fungicides to control the disease.

Procedures Used

Two trials were conducted, one on the West Side Field Station and the second with a cooperating grower near Firebaugh. The fungicides were

applied with a CO_2 constant pressure sprayer except the granular formulation at the West Side Field Station trial which was applied with a Gandy applicator.

In the broadcast application of Sulfur and emulsifiable concentration (EC), formulated fungicides 11006 nozzle tips were used. In the crown application, where the spray was directed to the base of the leaf stalks or crown, 02506 nozzle tips were used.



The most recently matured leaves were evaluated every two weeks to ascertain the degree of mildew infestation.

Evaluations were made at two week intervals by examining 25 recently matured leaves, in the two center rows of each 4 row plots, and estimating the degree of infestation.

Yield data was obtained by harvesting two rows in each plot with a commercial type one-row digger equipped with a scale. Two subsamples were taken from

each plot, one from each of the two rows harvested, and submitted for analysis by the tare laboratory at Spreckels Sugar Division near Mendota.

The dates of treatments, evaluations of mildew infestation, yield data, and other information are presented in Tables 12 through 19. The observations made and the information obtained can be briefly outlined as follows:

- The most effective mildew control was obtained with the experimental fungicide designated as CGA-64250. A single treatment at 0.25 lb ai/A applied broadcast provided excellent seasonal control.

- Significant differences among treatments in Trial II were not observed. No explanation is available why mildew did not develop in the untreated and sulfur treated plots. It is plausible that CGA-64250 is sufficiently volatile to have controlled the mildew in the untreated areas. Larger plots may be needed for the evaluation of CGA-64250.

- Bayleton provided significantly better mildew control and beet yield than sulfur.

- The most effective control was obtained with the granular formulation applied into the crown.

- Crown application of the EC formulation resulted in significantly better mildew control and higher tonnage than was obtained from broadcast application.

- One half (0.5 lb ai/A) pound of active ingredient of Bayleton formulated as 5% granular provided comparable results to that obtain with 1.0 lb ai/A of the EC formulation applied in the crown.

- Two applications of 20 lb/A of flowable sulfur did not provide significantly better control than 3 applications. However, 2 or 3 applications were significantly better than a single application.

- Repeated applications of low rates of wettable or flowable sulfur did not protect the beets from mildew infection, see Tables 17 through 19.

In Summary

The detrimental effects of powdery mildew on sugar beet yield and quality were clearly demonstrated. Multiple applications of sulfur can provide some protection but significant yield increases can be obtained with Bayleton applied at 0.5 lb ai/A as a granular formulation or as a crown treatment with the EC formulation.

CGA-64250 could be a very promising fungicide for mildew control in sugar beets. Its further evaluation should be aggressively pursued.

Table 1: Effect of Preplant Incorporated and Preemergence Herbicides on Weed Control and Sugar Beet Vigor
302, 425, 91, 10, 80-10

Trial Location: Westside Field Station
Soil Type: Panoche Loam
Plot Size: PPI - 2 beds(12"on 30")x40'
Preem - 5'x40' - 3 reps
Evaluated: 6/21/80

Variety: SP H-9
Planted 5/21/80
Herbicides Applied: 21 May 1980 except treatments E & F and A preemergence 5/27/80
Irrigation Method: Sprinkler-5/27/80

Weed Control and Beet Vigor Evaluations - Average of 3 Replications [1]

Herbicides	lb ai/A	Preemergence Application						Preplant Incorporated				
		Bdlf Weeds		Barnydgrass		Barley		Beet Vigor	Bdlf Weeds	Barnyd Grasses	Barley	Beet Vigor
		Furrow	Top	Furrow	Top	Furrow	Top					
A Roneet	4.0	7.7	8.7	7.3	10.0	3.3	2.3	9.7	9.7	9.7	9.7	7.3
B Roneet + Extender	4.0	8.3	5.0	7.3	7.7	3.3	1.3	9.0	9.7	9.7	8.7	8.0
C Nortron EC	1.5	6.0	8.3	10.0	10.0	6.0	5.3	9.0	3.3	8.7	9.7	9.0
D Nortron EC	3.0	5.3	9.0	9.3	10.0	9.0	8.3	9.0	7.0	10.0	10.0	8.7
E Nortron EC	1.5	6.7	8.3	10.0	10.0	7.3	6.7	10.0	---	---	---	---
F Nortron EC	3.0	6.3	6.7	6.7	6.7	6.3	5.7	9.7	---	---	---	---
G Antor B + Nortron	2.0 + 1.5	10.0	10.0	10.0	10.0	7.0	6.7	9.3	10.0	10.0	9.3	8.0
H Antor B + Nortron	4.0 + 1.5	10.0	10.0	9.3	10.0	7.7	6.7	7.7	10.0	10.0	9.7	7.7
J Antor A + Nortron	2.0 + 1.5	9.7	9.7	9.3	10.0	8.3	7.3	8.0	10.0	10.0	9.3	9.0
K Antor A + Nortron	4.0 + 1.5	10.0	10.0	9.7	10.0	8.3	8.3	6.0	9.7	10.0	9.7	7.3
L Antor A	4.0	7.3	10.0	6.3	10.0	5.0	3.7	9.3	10.0	10.0	8.7	8.7
M Antor B	4.0	9.3	10.0	7.0	9.7	4.3	4.3	9.7	9.7	10.0	8.3	8.7
N Untreated	---	---	---	---	---	---	---	---	0	0	0	9.7

1/ Evaluations based on a 0 to 10 scale. 0=no control or poor vigor; 10=perfect weed control or vigorously growing beets.

Remarks: Herbicides applied with a CO_2 sprayer. In the preplant incorporated treatments the herbicides were applied in a 12" band and incorporated to a depth of 2½" with a power driven rotary tiller. In the preemergence treatments the entire plots were treated. Barley and barnyardgrass were sown in the area.

Table 2: Effect of Preplant Incorporated Herbicide on Weed Control and Sugar Beets
302, 425, 91, 10, 80-11

Trial Location: DesJardins Ranch
4½ mi W of shop (Hdq)
Soil Type: Oxalis Silty Clay
Evaluated: 6/27/80 and 7/2/80

Established: 5/28/80
Plot Size: 40' x 2 bed(12")
Variety: SPH-9
Irrigation Method: Furrow

Weed Control, Beet Injury and Beet Stand Evaluations - Average of Four Replications

Herbicide			27 June 1980 1/ No. of Beets	No. of Bdlf	No. of Grasses	2 July 1980 2/ Bdlf Control	Grass Control	Beet Vigor
A	Roneet	4.0	14.7	3.5	10	7.0	5.2	7.2
B	Roneet + Extender	4.0	22.0	3.5	9.5	4.5	5.0	9.2
C	Roneet	6.0	17.0	3.0	5.2	5.2	3.5	8.2
D	Antor A	3.0	15.2	1.2	0	8.7	9.7	7.5
E	Antor B	3.0	14.0	2.7	0	9.0	9.2	8.2
F	Antor A + Nortron	2.0 + 2.0	17.5	0	0	9.7	9.7	8.5
G	Antor B + Nortron	2.0 + 2.0	20.2	1	0	9.5	10	8.2
H	Antor A + Pyramin	2.0 + 3.0	19.2	0.5	0	9.2	9.7	8.2
J	Antor B + Pyramin	2.0 + 3.0	20.5	0.7	0	9.2	9.7	8.2
K	Roneet + Nortron	4.0 + 2.0	14.7	0.5	2.2	8.7	6.0	8.7
L	Nortron	3.0	15.0	1.0	2.2	9.7	6.7	7.5
M	Untreated	---	14.5	5.7	3.2	3.0	4.2	7.7

1/ Stand counts made in two 4'x6" areas in each plot. Values represent the average of 8 counts.
2/ Weed control and beet vigor evaluations are based on a 0 to 10 scale. 0=no control or very poor vigor; 10=perfect weed control or vigorously growing beets.

Table 3: Effect of Two Experimental Herbicides on Grass Control and Sugar Beet Injury

Trial Location: Wooten Ranch
Eucalyptus & Brennan Aves.
Soil Type: Lathant Silty Clay
Herbicides Applied: 6/12/80

Beet Variety: US-H9 - in 4 leaf
Plot Size: 5'x30'-4 reps
Temperature: 76°F
Irrigation Method: Furrow
Evaluated: 20 June 1980

Herbicide	lb ai/A	Barnyardgrass Control and Beet Injury Evaluation[1]/ Grass Control	Beet Injury
A Poast PACE	0.5 1 qt. >	8.0	1.5
B Poast PACE	1.0 1 qt. >	8.7	1.2
C RO 13-8895 PACE	1.0 1 qt. >	8.8	4.5
D RO 13-8895 PACE	2.0 1 qt. >	9.6	5.0
E Untreated	---	0.7	0.5

1/ Evaluations based on a 0 to 10 scale
0=no weed control or no beet injury
10=perfect weed control or severe beet injury

Table 4-A: Effect of Postemergence Herbicides on Weed Control and Beet Injury
302, 425, 91, 10, 80-3

Trial Location: 1 mi. N of Mendota on Hwy 33 across Sp Storage Tanks
Soil Type: Lathant Silty Clay
Herbicides applied 7 March 1980 - 65°F

Plot Size: 2 rows (30") x 20'
Variety: SPH 9 Bl - 6 leaves
Irrigation Method: Furrow
Evaluated: 14 March 1980

Herbicides	lb ai/A	Weed Control, Beet Injury and Weeds Present[1/]						
		Knot-weed	Lambs-qrtr	Sands-spurry	Grass Control	Overall Control	Beet Injury	Other Bdlf Weeds[2/]
A Betanal	0.75	4.0	7.7	5.3	7.3	7.3	1.3	P=2.0
Betanex	0.75							
Poast	0.5							
B Betanal	0.75	3.3	7.3	4.7	7.7	7.7	1.3	-----
Betanex	0.75							
Poast	1.0							
C Betanal	0.75	3.3	7.7	5.0	7.3	7.0	1.3	-----
Betanex	0.75							
KK80	1.0							
D Betanal	0.75	2.7	8.3	6.0	7.3	7.3	2.0	P=3.0, Y=0
Betanex	0.75							Cl=3.0
KK80	2.0							
E Betanal	1.0	7.7	8.3	7.0	5.3	7.0	2.7	P=3.0
Endothal	0.75							
Dowpon	2.0							
F Untreated	---	0	0	0	0	0	0.3	P=0,Cl=0 Y=0

1/ Evaluations based on a 0 to 10 scale. 0=no weed control or no injury, 10=perfect weed control or severe beet injury.
2/ Other weeds: Cl=clover
P=prickly lettuce
Y=pineapple weed

Table 4-B: Effect of Postemergence Herbicides on Weed Control and Beet Injury
302, 425, 91, 10, 80-3

Trial Location: 1 mi. N of Mendota on Hwy 33, across SP Storage Tanks
Soil Type: Lathant Silty Clay
Herbicides Applied: 3/7/80 - 65ºF

Plot Size: 2 rows (30")x20'
Variety: SPH 9 B1
Irrigation Method: Furrow
Evaluated: 3/20 and 3/24/80

Herbicides	lb ai/A	Evaluations of Weed Control, Beet Injury and Weeds Present[1] Bdlf Control	Grass Control	Beet Injury	Weeds[2] Present	3/24/80 Beet Injury
A Betanal Betanex Poast	0.75 0.75 0.5	9.1	9.6	0.3	Ch,Cl,K,P,Sa	0.3
B Betanal Betanex Poast	0.75 0.75 1.0	9.0	10.0	0.3	C,Cl,K,P,Sa,Y	0.3
C Betanal Betanex KK80	0.75 0.75 1.0	8.8	9.5	0.6	C,Cl,E,K,Sa	0.8
D Betanal Betanex KK80	0.75 0.75 2.0	9.0	9.6	1.1	C,Cl,K,M,Y	0.3
E Betanal Endothal Dowpon	1.0 0.75 2.0	7.0	6.0	1.1	C,Cl,G,M,Sa,V	0.3
F Untreated	---	0	0	0	C,Ch,Cl,E,G,K M,P,Sa,V,Y	0

1/ Evaluations based on a 0 to 10 scale. 0=no control or no injury, 10=perfect weed control.

2/ Weeds present:
C=crabgrass
Ch=cheeseweed
Cl=clover
E=catsear
G=grass poly
K=knotweed
M=marestail
P=prickly lettuce
Sa=sandspurry
V=vinegarweed
Y=pineapple weed

Table 5: Effect of Herbicides on Postemergence Control on Broadleaf Weeds in Sugar Beets
302, 425, 91, 10, 80-2

Trial Location: Ave. 6 and Rd. 61
Tierra Buena No. 1
Soil Type: Delhi Sand
Beet Variety: S-193H
Beets Planted: 2/7/80

Herbicides Applied: 3/7/80
2 leaf stage
Plot Size: 56"x30'
3 replications
Evaluated: 3/17/80

Herbicide	lb ai/A	Broadleaf Control and Beet Injury Evaluation[1] Bdlf Control	Beet Injury	Weeds Present[2]
A Betanal Betanex	.75 .75	9.7	1.3	F,P,R
B Betanal Betanex Endothal	.75 .75 .5	9.8	1.0	R
C Endothal X-77	.5 ½%	3.3	2.7	R,S,T
D Endothal X-77	.75 ½%	3.7	3.0	F,G,R,S
E Betanal Endothal	1.0 .5	8.7	1.3	R,S
F Untreated	---	1.0	1.0	F,G,P,R,S,T

1/Evaluation based on a 0 to 10 scale. 0=no control or no injury, 10=perfect weed control or severe beet injury.
2/Weeds present:
F=filaree
G=groundsel
P=popcorn flower
R=red maids
S=shepherds purse
T=Russian thistle

Table 6: Effect of Postemergence Herbicides on Sugar Beets and Weed Control
302, 425, 91, 10, 80-12

Trial Location: O'Banion Ranch, Russel and Althea Aves.
Soil Type: Lathant Silty Clay
Herbicides Applied: 6/12/80
Beet Variety: US-H9 in 2 to 4 true leaves

Plot Size: 5'x30' - 3 replications
Irrigation Method: Sprinkler
Temperature 76ºF
Evaluated: 6/20 & 6/25/80

Herbicide	lb. ai/ Acre	Weed Control and Beet Injury Evaluations[1/] 20 June 1980 Beet Injury	20 June 1980 Bdlf Control	20 June 1980 Grass Control	25 June 1980 Beet Injury	25 June 1980 Grass Control	% Beet Stand Reductions
A Betanal Betanex Poast	0.65 0.65 0.25	5.6	10	9.6	4.0	9.8	78.4
B Betanal Betanex Poast	0.65 0.65 0.50	5.6	9.6	9.6	4.0	9.6	63.4
C Betanal Betanex Poast	0.65 0.65 1.0	6.3	10	10	5.3	10	73.4
D Betanal Betanex RO 13-8895	0.65 0.65 0.5	6.6	9.6	10	3.3	9.6	81.7
E Betanal Betanex RO 13-8895	0.65 0.65 1.0	7.6	10	10	5.0	10	86.7
F Betanal Betanex Nortron	0.65 0.65 2.0	6.3	9.0	10	5.0	8.6	70
G Nortron	2.0	3.3	2.6	7.6	1.6	5.0	3.7
H Untreated	---	1.0	0	5.6	0	0	1.7

1/ Evaluations based on a 0 to 10 scale. 0=no weed control or no beet injury, 10=perfect weed control or severe beet injury.

Table 7: Effect of Postemergence Herbicides on Volunteer Barley Control and Beet Injury
302, 425, 91, 10, 80-14

Trial Location: Westside Field Station
Soil Type: Panoche Loam
Plot Size: 25'x40', 4 reps
Herbicides Applied: 6/17/80

Variety: US H9
Irrigation Method: Furrow
Evaluated: 6/21/80 & 7/8/80

			Weed Control, Beet Injury and Stand Evaluations[1/]						
			21 June 1980			8 July 1980			
	Herbicide	lb ai/A	Pigweed Control	Barley Control	Beet Injury	Pigweed Control	Barley Control	Beet Vigor	%Beet Stand
A	Betanal	0.65	8.0	3.0	3.8	9.5	7.0	7.0	79
	Betanex	0.65							
	Poast	0.25							
B	Betanal	0.65	8.0	4.0	5.3	10	7.7	6.0	79
	Betanex	0.65							
	Poast	0.5							
C	Betanal	0.65	8.0	5.0	6.5	10	8.5	6.0	78
	Betanex	0.65							
	Poast	1.0							
D	Betanal	0.65	8.0	3.8	5.0	9.5	6.5	6.2	78
	Betanex	0.65							
	RO 13-8895	0.5							
E	Betanex	0.65	7.0	4.8	6.5	7.0	7.5	6.2	66
	RO 13-8895	1.0							
F	Betanal	0.65	8.0	6.0	7.5	10	8.7	5.7	53
	Betanex	0.65							
	RO 13-8895	2.0							
G	Untreated	---	0	0	0.5	0	0.5	7.5	88

1/ Evaluations based on a scale of 0 to 10. 0=no weed control or no injury, 10=perfect weed control or very severe beet injury. Percent stand was visually estimated.

Table 8: Effect of Postemergence Herbicides on Weed Control and Beet Injury
302, 425, 91, 10, 80-15

Trial Location: Hwy 33, S of Shain Rd, W of 33-Bill DesJardins
Soil Type: Merced Clay
Evaluated: 6/25/80 and 7/2/80

Plot Size: 2 rows (5')x30'
Variety: SPH 9B
Irrigation Method: Furrow
Temperature: 80°F at 1:45 p.m.

Herbicide	lb ai/A	Weed Control and Beet Injury Evaluations-Average of 3 Replications[1]					
		25 June 1980			2 July 1980		
		Bdlf Control	Grass Control	Beet Injury	Bdlf Control	Grass Control	Beet Injury
A Poast Pace	0.5 1qt	0	4.0	1.0	0	9	0
B Poast Pace	1.0 1qt	0	5.6	2.0	0	10	0
C RO 138895 Pace	0.5 1qt	0	4.6	2.6	2.0	9.6	0
D RO 138895 Pace	1.0 1qt	0	5.0	4.0	1.3	10	0.6
E Betanal Betanex Poast	0.65 0.65 .25	8.0	7.6	4.6	7.6	9.0	1.0
F Betanal Betanex Poast	0.65 0.65 0.5	8.3	7.6	4.0	8.0	10	1.6
G Betanal Betanex Poast	0.65 0.65 1.0	8.3	8.0	5.0	7.6	10	1.3
H Betanal Betanex RO 138895	0.65 0.65 0.5	8.0	6.6	4.3	8.0	7.0	1.3
J Betanal Betanex RO 138895	0.65 0.65 1.0	8.0	8.3	6.3	7.6	8.0	1.6
K Betanal Betanex Hoelon	0.65 0.65 2.0	8.0	6.6	5.6	8.0	5.0	2.3
L Betanal Betanex Nortron	0.65 0.65 2.0	8.3	7.0	5.6	8.0	3.6	2.6
M Untreated	---	0	0	0	0	0	0

1/ Evaluations based on a 0 to 10 scale. 0=no weed control or no beet injury. 10=perfect weed control or very severe injury.

Remarks: Weeds present at the time of treatment: Barnyardgrass (2 to 6 leaves up to 3"),pigweeds 1-2" tall, cheeseweed 1-2" diam. lvs, clover 1-2 leaves.

Table 9: Effect of Postemergence Herbicides on Weed Control and Sugar Beets 302, 425, 91, 10, 80-9

Trial Location: Ave. 6, Road 16, 1 mile So.
Soil Type: Columbia Sandy Loam
Variety: SP H-9
Herbicide Applied: 5/13/80

Plot Size: 2 rows (56") x 30', 4 reps
Irrigation Method: Sprinkler
Evaluated: 5/22/80 and 6/5/80

Herbicide	lb ai/A	Weed Control and Beet Injury Evaluations[1] 22 May 1980				5 June 1980			
		Beet Injury	Grass[2] Control	Brdlf[2] Control	Overall[3] Weed Control	Beet Injury	Grass[2] Control	Brdlf[2] Control	Overall[3] Weed Control
A Betanal	0.75	3.3	6.7	9.2	5.2	1.0	5.5	8.4	4.2
Betanex	0.75								
Poast	0.25								
B Betanal	0.75	3.2	7.2	8.0	5.5	1.0	8.0	9.2	5.8
Betanex	0.75								
Poast	0.5								
C Betanal	0.75	2.7	7.5	9.0	6.7	1.0	9.0	9.2	6.5
Betanex	0.75								
Poast	1.0								
D Betanal	0.75	2.7	5.2	8.5	4.2	1.0	2.0	7.8	2.2
Betanex	0.75								
RO-138895	0.25								
E Betanal	0.75	3.0	5.7	9.2	5.5	1.2	4.2	9.5	2.5
Betanex	0.75								
RO 138895	0.50								
F Betanal	0.75	2.2	6.2	8.7	5.0	1.0	6.2	9.5	5.0
Betanex	0.75								
RO 138895	1.0								
G Betanal	0.75	2.7	6.7	8.0	5.7	1.5	6.2	9.5	4.8
Betanex	0.75								
Endothal	0.5								
Poast	0.5								
H Betanal	0.75	3.0	6.7	9.0	5.7	1.2	6.0	10	5.2
Betanex	0.75								
Hoelon	2.0								
J Untreated	---	1.2	2.2	6.2	0	1.0	1.0	2.0	1.0

1/ Weed control and beet injury evaluations are based on a 0 to 10 scale. 0=no weed control or no injury, 10=perfect weed control or very severe injury.
2/ Reflects weed control on top of the bed where preemergence herbicides were applied.
3/ Overall weed control evaluations are of little value because of the size of the broadleaf weeds when treated.
Remarks: Nortron plus Pyramin was applied preemergence in a 6" band by the grower.

Weeds present: Knotweed, Filaree, dock, lambsquarter, groundsel, shepherds purse, cocklebur, pigweed, barnyardgrass, yellow nutsedge. Many of the broadleaf weeds were 6 to 8 inches tall especially in the furrows when treated.

Table 10: Effect of Postemergence Herbicides on Beet Injury and Weed Control
302, 425, 91, 10, 80-16

Trial Location: Hwy 33 & Shain Rd
DesJardins Farm
Soil Type: Merced Clay
Beet Variety: SPH-9B - 4 to 8 leaves
Herbicides Applied: 25 June 1980

Plot Size: 1'x30' - 3 reps.
Temperature: 85°F
Time of Treatment: 3 p.m.
Irrigation Method: Furrow
Evaluated: 2 July 80

Herbicide	lb ai/A	Beet Injury & Grass Control Evaluation 1/ Beet Injury	Grass Control
A Poast Pace	0.5 1qt	0.6	4.6
B Poast Pace	1.0 1qt	1.6	6.6
C RO 138895	0.5	0.6	1.0
D RO 138895 X-77	0.5 ½%	3.6	5.0
E RO 138895 Pace	0.5 1qt	1.6	4.3
F RO 138895 X-77	1.0 ½%	4.6	6.0
G Betanal Betanex Poast	0.65 0.65 0.5	2.6	7.0
H Betanal Betanex Poast	0.65 0.65 1.0	3.0	7.0
J Betanal Betanex RO 138895	0.65 0.65 0.5	3.6	5.3
K Betanal Betanex RO 138895	0.65 0.65 1.0	4.0	4.6
L Betanal Betanex Nortron	0.65 0.65 2.0	6.0	4.3
M Untreated	---	0	0

1/ Evaluations based on a 0 to 10 scale. 0=no weed control or no injury, 10=perfect control or severe beet injury.

Remarks: Later evaluations could not be made because the trial area was hoed by mistake; however, good beet recovery was observed in all plots.

Table 11: Effect of Sequential Application of Postemergence Herbicides on Weed Control and Beet Injury
302, 425, 91, 10, 80-17

Trial Location: Des Jardins Ranch
4½ mi W of Hdq, Hwy 33 & Fairfax
Soil Type: Oxalis Silty Clay
Evaluated: 7/2/80 & 7/15/80

Plot Size: 30" x 40', 4 reps
Variety: SPH 9
Planted: 5/25/80
Irrigation Method: Furrow
Temperature: 80°F - 3 p.m.

Herbicides	lb ai/A	Date Applied	Weed Control, Beet Injury and Beet Stand Evaluations[1/] 2 July 1980 Grass Control	2 July 1980 Bdlf Control	2 July 1980 Beet Injury	15 July 1980 Grass Control	15 July 1980 Bdlf Control	15 July 1980 Beet Vigor	15 July 1980 %Beet Stand
A Betanal	0.65	6/27	0.7	8.7	4.5	9.0	9.2	8.2	72.5
Betanex	0.65	6/27							
Poast	0.5	7/2							
PACE	1qt	7/2							
B Betanal	0.65	6/27	2.2	8.5	4.5	9.5	9.5	7.7	72.5
Betanex	0.65	6/27							
Poast	1.0	7/2							
PACE	1qt	7/2							
C Betanal	0.65	6/27	2.0	7.2	5.5	9.5	9.5	7.2	58.7
Betanex	0.65	6/27							
RO 138895	0.5	7/2							
PACE	1qt	7/2							
D Betanal	0.65	6/27	2.0	9.2	5.5	9.7	9.2	7.5	62.5
Betanex	0.65	6/27							
RO 138895	1.0	7/2							
PACE	1qt	7/2							
E Betanal	0.65	6/27	6.7	8.7	6.0	7.5	9.0	8.0	62.5
Betanex	0.65	6/27							
Poast	0.5	6/27							
F Betanal	0.65	6/27	7.0	9.5	7.2	9.0	9.2	7.2	46.2
Betanex	0.65	6/27							
Poast	1.0	6/27							
G Betanal	0.65	6/27	3.7	6.5	4.0	4.7	9.0	8.2	68.7
Betanex	0.65	6/27							
RO 138895	0.5	6/27							
H Betanal	0.65	6/27	5.0	8.5	5.0	5.5	9.5	8.0	70.0
Betanex	0.65	6/27							
RO 138895	1.0	6/27							
J Poast	0.5	6/27	3.2	0	1.2	7.7	9.7	8.0	68.7
PACE	1qt	7/2							
Betanal	0.65	7/2							
Betanex	0.65	7/2							
K Poast	1.0	6/27	4.2	0	1.7	9.2	9.0	7.5	72.5
PACE	1qt	6/27							
Betanal	0.65	7/2							
Betanex	0.65	7/2							
L RO 138895	0.5	6/27	2.5	0	2.5	7.0	9.5	8.0	70.0
X-77	½%	6/27							
Betanal	0.65	7/2							
Betanex	0.65	7/2							
M RO 138895	1.0	6/27	4.0	0	3.2	10	9.0	7.7	75.0
X-77	½%	6/27							
Betanal	0.65	7/2							
Betanex	0.65	7/2							
N Untreated	---	---	0	0	0	0	0	9.0	80.0

1/ Rating based on 0 to 10 scale. 0=no weed control, no injury or poor vigor, 10=perfect weed control, severe injury or vigorously growing beets.

Table 12: Sugar Beet Mildew Control Trial
302, 422, 91, 10, 80-2 & 3

Location: Westside Field Station
Soil Type: Panoche Loam
Beets Planted: 31 March 1980
Trial Established: 10 June 1980

Beet Variety: US-H9
Irrigation: Furrow
Plot Size: 4 rows (30") x 50'

	Trial I	lb ai/A	Method	Dates of Treatment	%Mature Leaf Area Diseased on Dates Shown[1/] 7/8	7/22	8/5	8/18	9/2	9/16
A	Untreated	---	-----	--------	5	76	83	81	94	86
B	Bayleton 5 Gr	0.5	Crown	6/10	0	0.6	0.6	5	14	20
C	Bayleton 5 Gr	1.0	Crown	6/10	0	0.05	0	1	5	7
D	Bayleton 50 WP	0.5	Crown	6/10	0	0.3	2	10	28	46
E	Bayleton 50 WP	1.0	Crown	6/10	0	0.02	0.1	2	12	18
F	Bayleton 50 WP	0.5	Bdcst	6/10	0	18	38	57	74	84
G	Bayleton 50 WP	1.0	Bdcst	6/10	0	1.0	3.0	26	53	64
H	Sulfur Flo	20.0	Bdcst	6/10	2	67	74	76	87	89
J	Sulfur Flo	20.0	Bdcst	6/10,7/8	2	21	36	80	91	93
K	Sulfur Flo	20.0	Bdcst	6/10,7/8,8/5	2	21	36	36	81	88
	Trial II									
L	CGA-64250 EC	0.25	Bdcst	6/10,7/22	0	0.02	0	0	0	0
M	CGA-64250 EC	0.25	Bdcst	6/10	0	0.01	0	0.4	1	5.0
N	CGA-64250 EC	0.5	Bdcst	6/10,--,--	0	0	0	0	1	6.0
P	CGA-64250 EC	0.5	Bdcst	6/10,7/22,--	0	0.01	0	0	0	0
Q	CGA-64250 EC	1.0	Bdcst	6/10,--	0	0	0	0	0	0.1
R	Sulfur 6 Flo	6.0	Bdcst	6/10,7/8,--	5.0	5.0	5.0	13.0	5.0	17.0
S	Untreated	---	-----	--------	0.5	0.7	0.5	0.5	2.0	12.0

1/ The most recently matured leaf was used on 25 plants in each plot to determine the percent of mildew infestation.

Table 13 Sugar Beet Mildew Control Trial & Yield Data
302, 422, 91, 10, 80-2

Trial Location: Westside Field Station
Soil Type: Panoche Loam
Beets Planted: 31 March 1980
Mildew Trial Established: 6/10/80

Variety: USH-9
Irrigation: Furrow
Harvested: 23 Sep 1980
Harvest Area: 2 rows (30") x 50'

					Average Yield/Acre, Sugar Percent of Nitrate Concentration			
Fungicides	lb ai/A	Method	Dates of Treatment		Beets T/A	Sugar Percent	Sugar T/A	Nitrate PPM
A Untreated	---	---			26.0	11.6	3.0	131.5
B Bayleton 5 Gr	0.5	Crown	6/10		32.1	12.6	4.0	56.5
C Bayleton 5 Gr	1.0	Crown	6/10		30.4	12.7	3.8	106.0
D Bayleton 50 WP	0.5	Crown	6/10		31.0	12.1	3.7	84.2
E Bayleton 50 WP	1.0	Crown	6/10		30.3	13.2	4.0	85.5
F Bayleton 50 WP	0.5	Bdcst	6/10		28.3	12.1	3.4	79.5
G Bayleton 50 WP	1.0	Bdcst	6/10		29.9	12.7	3.8	72.7
H Sulfur Flo	20.0	Bdcst	6/10		24.8	11.4	2.8	170.00
J Sulfur Flo	20.0	Bdcst	6/10	7/8	29.1	12.0	3.5	91.2
K Sulfur Flo	20.0	Bdcst	6/10	7/8 8/5	30.2	11.8	3.5	137.2
Statistical Notation)	LSD 5%				3.1	.99	.47	45.0
)	LSD 1%				4.2	1.2	.64	60.8

Remarks: Harvested area was 250 Ft^2, values represent average calculated yields per acre.

Table 14 Sugar Beet Mildew Control Trial Yield Dates
302, 422, 91, 10, 80-2

Trial Established: Westside Field Station
Beets Planted: 31 March 1980
Soil Type: Panoche Loam
Mildew Trial Established: 6/10/80

Irrigation: Furrow
Variety: USH-9
Harvested: 23 Sep 1980
Harvested Area: 2 rows (30") c 50'

					Yield Expressed as Percent of Untreated			
Fungicides	lb ai/A	Method	Dates of Treatment		Beets T/A	Sugar Percent	Sugar T/A	Nitrate PPM
A Untreated	---	---			100.0	100.0	100.0	100.0
B Bayleton 5 Gr	0.5	Crown	6/10		123.2	108.7	134.7	42.9
C Bayleton 5 Gr	1.0	Crown	6/10		116.6	109.4	127.2	80.6
D Bayleton 50WP	0.5	Crown	6/10		118.9	104.8	124.7	64.0
E Bayleton 50WP	1.0	Crown	6/10		116.2	114.3	133.2	65.0
F Bayleton 50WP	0.5	Bdcst	6/10		108.6	104.4	113.7	60.4
G Bayleton 50WP	1.0	Bdcst	6/10		114.8	110.1	126.7	55.3
H Sulfur Flo	20.0	Bdcst	6/10		95.3	98.2	93.7	129.2
J Sulfur Flo	20.0	Bdcst	6/10	7/8	111.8	103.6	115.9	69.3
K Sulfur Flo	20.0	Bdcst	6/10	7/8 8/5	115.7	102.1	118.1	104.3

Remarks: Harvested area was 250 Ft^2, values represent coverage calculated yields per acre.

Table 15 Sugar Beet Mildew Control Trial Yield Data
302, 422, 91, 10, 80-2 & 3

Location: WSFS
Fungicide Applied: 6/10/80
Soil Type: Panoche Loam

Irrigation: Furrow
Harvested: 23 Sept. 1980

Trial II

Fungicides	lb ai/A	Method	Dates of Treatment	Average Yield Per Acre, Sugar Percentage & Nitrate Concentration			
				Beets T/A Calc	Sugar %	Sugar T/A Calc	Nitrate PPM
L CGA-64250 EC	0.25	Bdcst	6/10,7/22	31.2	11.0	3.4	116
M CGA-64250 EC	0.25	Bdcst	6/10	27.0	12.3	3.3	67.5
N CGA-64250 EC	0.5	Bdcst	6/10,--,--	29.8	12.6	3.7	71.6
P CGA-64250 EC	0.5	Bdcst	6/10,7/22,--	30.4	12.6	3.8	78.1
Q CGA-64250 EC	1.0	Bdcst	6/10,--	28.6	12.6	3.6	94.5
R Sulfur 6 Flo	6.0	Bdcst	6/10,7/8,--	29.4	11.3	3.3	94.8
S Untreated	---	---	---------	28.8	11.3	3.2	87.5
Statistical Notation LSD 5%				N.S.	N.S.	.47	N.S.

Remarks: Harvested two center rows with commercial type digger.

Table 16 Sugar Beet Mildew Control Trial Yield Data
302, 422, 91, 10, 80-2 & 3

Location: WSFS
Fungicide Applied: 6/10/80
Soil Type: Panoche Loam

Irrigation: Furrow
Harvested: 23 Sep 1980

Trial III

Fungicides	lb ai/A	Dates of Treatment	Average Yield/A, Sugar % & Nitrate Concentration: Beets T/A Calc	Sugar &	Sugar T/A Calc	Nitrate PPM
L CGA-64250 EC	0.25	6/10,7/22	108.2	97.0	106.1	133.1
M CGA-64250 EC	0.25	6/10,	93.8	108.8	103.4	77.1
N CGA-64250 EC	0.5	6/10	103.3	111.7	116.7	81.8
P CGA-64250 EC	0.5	6/10,7/22	105.6	111.7	118.8	89.3
Q CGA-64250 EC	1.0	6/10	99.4	111.7	112.4	107.9
R Sulfur 6 Flo	6.0	6/10,7/8	101.9	100.0	103.1	108.3
S Untreated	---	--- ---	100.0	100.0	100.0	100.0

Remarks: Harvested two center rows with commercial type digger.

Table 17 Sugar Beet Mildew Control Trial Evaluations
302, 422, 91, 10, 80-1

Trial Location: Shaw & Washoe Aves
Firebaugh
Established: 3 June 1980
Variety: USH 9

Method: Foliar Application
Plot Size: 4 rows (30") x 40' - 4 reps
Irrigation Method: Furrow

	lb ai/A	Method	Dates of Treatment					Percent Mature Leaf Area Diseased on Dates Shown 1/ 6/24	7/2	7/15	7/29	8/12	8/26	9/9	10/1
A Bayleton*	0.5	Bdcst	6/3	7/15	8/18	---	---	0	5.0	61.8	39.6	0	0	0	26.1
B Bayleton*	1.0	Bdcst	6/3	---	---	---	---	0	0.1	29.8	14.9	5.3	20.6	7.6	49.0
C Bayleton*	0.5	Crown	6/3	---	---	---	---	0	0	9.1	13.7	7.6	14.9	30.4	44.3
D Bayleton*	1.0	Crown	6/3	---	---	---	---	0	0	2.1	2.3	0.4	2.3	2.3	76.5
E Bayleton*	5+.5	Bdcst	6/3	7/15	---	---	---	0	0	20.8	3.2	0	1.5	17.8	55.9
F Bayleton*	.5+.5	Crown	6/3	7/15	---	---	---	0	0.1	6.4	2.7	0	0	5.3	31.3
G Sulfur Flo**	2.5	Bdcst	6/3	7/2	7/15	---	9/9	10.0	71.5	89.1	65.6	25.1	56.6	36.0	22.9
H Sulfur Flo**	5.0	Bdcst	6/3	7/2	8/4	8/12	9/9	2.0	21.8	69.8	83.2	22.1	27.0	29.2	21.1
J Sulfur WP*	10.0	Bdcst	6/3	7/2	8/4	8/12	9/9	18.0	42.7	79.1	62.7	8.2	17.9	25.6	31.0
K Sulfur WP*	5.0	Bdcst	6/3	7/2	7/15	---	9/9	12.0	71.5	88.1	31.8	27.5	51.3	17.1	34.5
L Sulfur WP*	15.0	Bdcst	6/3	7/2	8/4	8/12	9/9	0	24.2	72.4	78.5	21.6	28.1	21.1	32.4
M Untreated	----		---	---	---	---	---	25.0	79.8	92.5	30.4	60.9	56.0	38.1	50.6

15 14 12 9 8 6 4 0

* X-77 added at ½% of spray volume

** THAT 6 lb/gal wettable sulfur

1/ The most recently matured leaf was used on 25 plants in each plot to determine the percent of mildew infestation.

Table 18: Sugar Beet Mildew Control Trial Evaluations
302, 422, 91, 10, 80-1

Trial Location: Shaw & Washoe Aves
Firebaugh
Established: 3 June 1980
Variety: USH 9

Method: Foliar Application
Plot Size: 4 rows (30") x 40' - 4 reps
Irrigation Method: Furrow

	Fungicides	lb ai/A	Method	Dates of Treatment					Average Yield/A, Sugar Percent & Nitrate Concentration: Beets T/A	Sugar Percent	Sugar T/A	Nitrate PPM
A	Bayleton*	0.5	Bdcst	6/3	7/15	8/18	---	---	30.4	10.5	3.2	87
B	Bayleton*	1.0	Bdcst	6/3	---	---	---	---	28.2	10.7	3.0	48
C	Bayleton*	0.5	Crown	6/3	---	---	---	---	28.3	10.2	2.9	77
D	Bayleton*	1.0	Crown	6/3	---	---	---	---	30.5	11.7	3.5	56
E	Bayleton*	.5+.5	Bdcst	6/3	7/15	---	---	---	29.0	10.5	3.0	44
F	Bayleton*	.5+.5	Crown	6/3	7/15	---	---	---	29.3	11.2	3.3	90
**G	Sulfur Flo	2.5	Bdcst	6/3	7/2	7/15	---	9/9	24.0	9.5	2.2	92
**H	Sulfur Flo	5.0	Bdcst	6/3	7/2	8/4	8/12	9/9	23.5	10.2	2.4	126
J	Sulfur WP*	10.0	Bdcst	6/3	7/2	8/4	8/12	9/9	24.1	10.5	2.5	60
K	Sulfur WP*	5.0	Bdcst	6/3	7/2	7/15	---	9/9	23.5	10.0	2.3	69
L	Sulfur WP*	15.0	Bdcst	6/3	7/2	8/4	8/12	9/9	24.1	10.0	2.4	55
M	Untreated	---		---	---	---	---	---	24.8	9.2	2.2	164
Statistical Notation			LSD 5%						.62	3.4	NS	NS
			LSD 1%						.84	4.6	NS	NS

* X-77 added at ½% of spray volume
** THAT 6 lb/gal wettable sulfur

Remarks: Harvested area was 200 Ft^2, values represent average calculated per acre.

Table 19: Sugar Beet Mildew Control Trial Evaluations
302, 422, 91, 10, 80-1

Trial Location: Shaw & Washoe Aves, Firebaugh
Soil Type: Panoche Silty Clay
Established: 3 June 1980
Variety: USH 9

Method: Foliar Application
Plot Size: 2 rows (30") x 50' - 4 reps
Irrigation Method: Furrow
Harvested: Oct 1, 1980

				Dates of Treatment					Average Yields/A, Sugar Percent & Nitrate Concentration			
		lb ai/A	Method						Beets T/A	Sugar Percent	Sugar T/A	Nitrate PPM
A	Bayleton*	0.5	Bdcst	6/3	7/15	8/18	---	---	122.4	113.5	140.1	53.3
B	Bayleton*	1.0	Bdcst	6/3	---	---	---	---	113.5	116.2	133.1	29.0
C	Bayleton*	0.5	Crown	6/3	---	---	---	---	114.2	110.8	128.4	46.9
D	Bayleton*	1.0	Crown	6/3	---	---	---	---	123.1	127.0	157.2	34.0
E	Bayleton*	.5+.5	Bdcst	6/3	7/15	---	---	---	117.0	113.5	134.1	26.9
F	Bayleton*	.5+.5	Crown	6/3	7/15	---	---	---	118.1	121.6	145.1	55.0
G	Sulfur Flo**	2.5	Bdcst	6/3	7/2	7/15	---	9/9	96.9	102.7	99.9	56.3
H	Sulfur Flo*	5.0	Bdcst	6/3	7/2	8/4	8/12	9/9	94.6	110.8	106.0	76.6
J	Sulfur WP*	10.0	Bdcst	6/3	7/2	8/4	8/12	9/9	97.0	113.5	111.7	36.3
K	Sulfur WP*	5.0	Bdcst	6/3	7/2	7/15	---	9/9	93.1	108.1	101.7	42.0
L	Sulfur WP*	15.0	Bdcst	6/3	7/2	8/4	8/12	9/9	97.0	108.1	105.8	33.4
M	Untreated	---		---	---	---	---	---	100.0	100.0	100.0	100.0

* X-77 added at ½% of spray volume
** THAT 6 lb/gal wettable sulfur

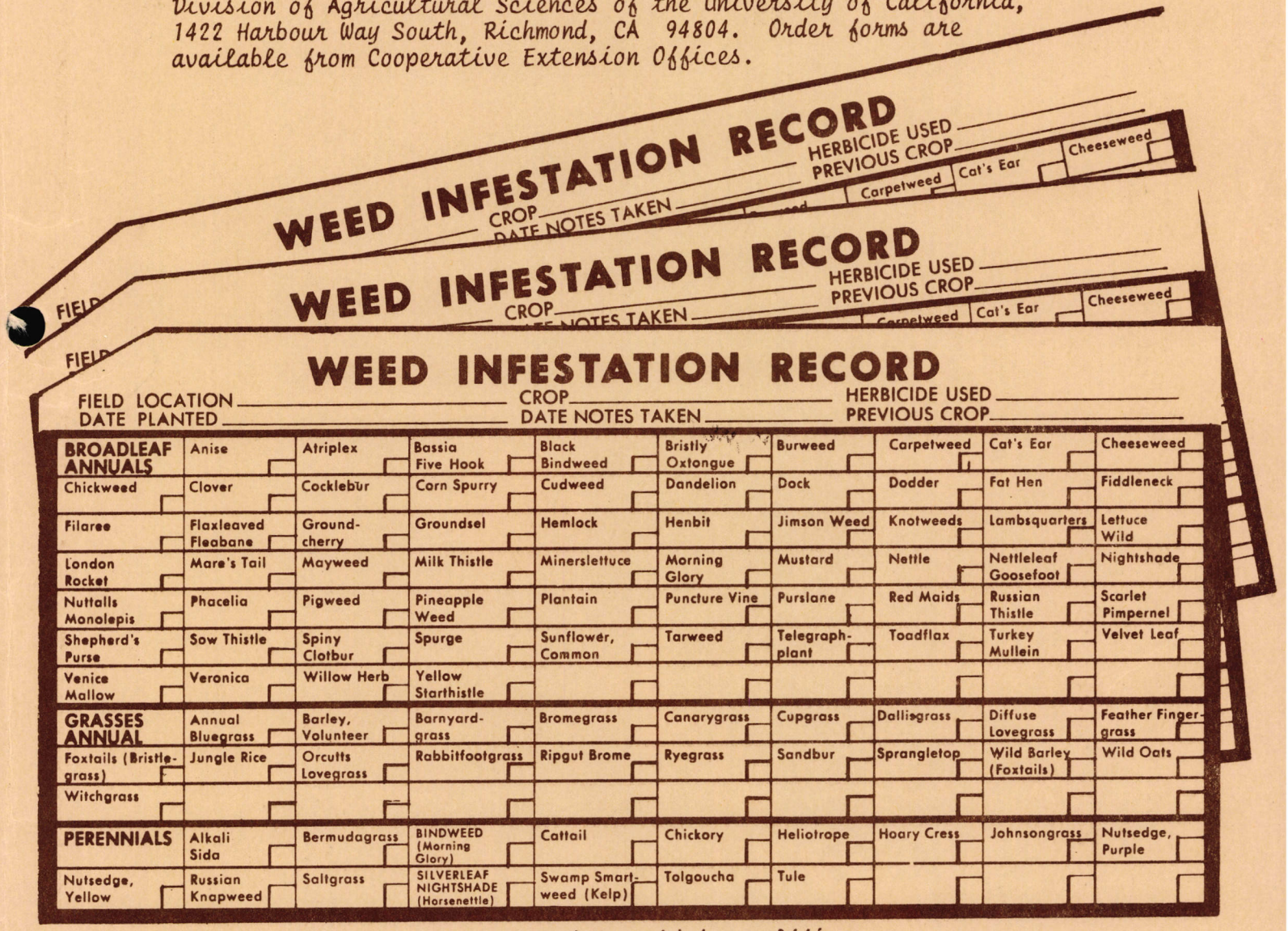
Remarks: Harvested area was 200 Ft^2, values represent average yield per acre.

TOWARD MORE EFFECTIVE WEED CONTROL

Without knowledge of the weed infestation it isn't possible to intelligently plan an economical weed control program.

Weed infestations recorded on weed infestation cards, such as the ones pictured below, will enable you to select a cropping sequence that can minimize your weed control costs. It can enable you to select the most effective tools whether mechanical or chemical. Cards such as these are available free from farm advisors and pest control advisors.

To help you identify weeds, the Growers Weed Identification Handbook with colored photographs of 167 commonly found weeds in California may be helpful. The handbook can be purchased from the Publications Division of Agricultural Sciences of the University of California, 1422 Harbour Way South, Richmond, CA 94804. Order forms are available from Cooperative Extension Offices.



WEED INFESTATION RECORD

FIELD LOCATION _____ CROP _____ HERBICIDE USED _____
DATE PLANTED _____ DATE NOTES TAKEN _____ PREVIOUS CROP _____

BROADLEAF ANNUALS	Anise	Atriplex	Bassia Five Hook	Black Bindweed	Bristly Oxtongue	Burweed	Carpetweed	Cat's Ear	Cheeseweed
Chickweed	Clover	Cocklebur	Corn Spurry	Cudweed	Dandelion	Dock	Dodder	Fat Hen	Fiddleneck
Filaree	Flaxleaved Fleabane	Ground-cherry	Groundsel	Hemlock	Henbit	Jimson Weed	Knotweeds	Lambsquarters	Lettuce Wild
London Rocket	Mare's Tail	Mayweed	Milk Thistle	Minerslettuce	Morning Glory	Mustard	Nettle	Nettleleaf Goosefoot	Nightshade
Nuttalls Monolepis	Phacelia	Pigweed	Pineapple Weed	Plantain	Puncture Vine	Purslane	Red Maids	Russian Thistle	Scarlet Pimpernel
Shepherd's Purse	Sow Thistle	Spiny Clotbur	Spurge	Sunflower, Common	Tarweed	Telegraph-plant	Toadflax	Turkey Mullein	Velvet Leaf
Venice Mallow	Veronica	Willow Herb	Yellow Starthistle						
GRASSES ANNUAL	Annual Bluegrass	Barley, Volunteer	Barnyard-grass	Bromegrass	Canarygrass	Cupgrass	Dallisgrass	Diffuse Lovegrass	Feather Finger-grass
Foxtails (Bristle-grass)	Jungle Rice	Orcutts Lovegrass	Rabbitfootgrass	Ripgut Brome	Ryegrass	Sandbur	Sprangletop	Wild Barley (Foxtails)	Wild Oats
Witchgrass									
PERENNIALS	Alkali Sida	Bermudagrass	BINDWEED (Morning Glory)	Cattail	Chickory	Heliotrope	Hoary Cress	Johnsongrass	Nutsedge, Purple
Nutsedge, Yellow	Russian Knapweed	Saltgrass	SILVERLEAF NIGHTSHADE (Horsenettle)	Swamp Smart-weed (Kelp)	Tolgoucha	Tule			

Farm and Home Advisors Office
1720 S. Maple
Fresno, California 93702
Telephone: (209) 453-5931

10 November 1980
800 copies

COOPERATIVE EXTENSION
U. S. DEPARTMENT OF AGRICULTURE
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA 94720

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300
RETURN POSTAGE GUARANTEED

POSTAGE AND FEES PAID
U. S. DEPARTMENT OF
AGRICULTURE
AGR 101



AN EQUAL OPPORTUNITY EMPLOYER