CALIFORNIA TURFGRASS CULTURE
FORMERLY, SOUTHERN CALIFORNIA TURFGRASS CULTURE

VOLUME 19, NO. 2 APRIL, 1969

SOUTHERN CHINCHBUG, A NEW PEST OF ST.AUGUSTINE GRASS IN SOUTHERN CALIFORNIA

By F. S. MORISHITA, R. N. JEFFERSON[1], and L. JOHNSTON[2]

This insect has been a serious pest of St. Augustine grass lawns in the southeastern and southcentral regions of the United States. From all the information available, the chinch bug may have been introduced into the Whittier area in 1967. In that year the Los Angeles County Commissioner's office reported they received numerous complaints of St. Augustine lawns being damaged and many of them turning "brown" in the late summer.

The southern Chinch bug, Blissus insularis Barber, has two adult forms. The long-winged and the short-winged adults are black with white wings (Fig. 1) . The short-winged forms have wings that are short and reach only half the body length. The immature stages have two colors, the last nymphal instars are black while the younger instars are briliant red. The eggs are translucent white with a red spot.

In 1968 a population study of the chinch bug was started in the residential area of Whittier. Several methods of collecting were tried (sweeping with an insect net and floating the bugs to the surface in water) but none was suitable for the study in mind. A D-Vat machine (Fig. 2) used in the cotton fields for sucking insects was tried and proved to be the most efficient way of collecting all stages

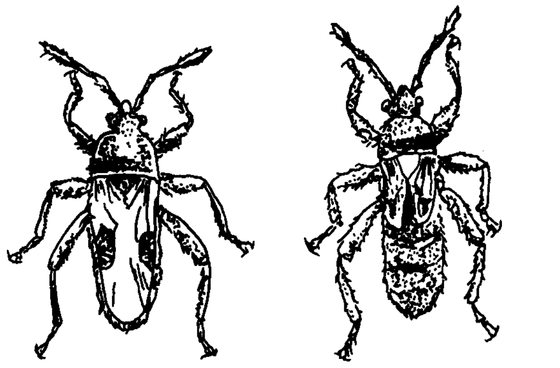

Fig. 1 Two forms of the Southern Chinch Bug adults

of the insect. The samples were brought into the lab and counted under a dissecting microscope and recorded.

From the year-long collection records, it appears that there are at least two generations as shown in Fig. 3. For some unexplainable reasons the adults were very difficult to collect. The graph showed that the population started to build up about the last of March and started to taper off about the last of October. The adults are readily seen especially in lawns where the damage is severe. In one of the lawns in the latter part of July, a one square foot sample from a heavily damaged lawn was taken and checked. The count from this sample showed 107 adults,

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Table 1 Experiment on control of Southern Chinch Bug on St. Augustine grass in Whittier, Calif. 1968

Date treated : 6- 19- 68

Materials	Dosage	Dates Sampled 6-26	7-10	7-24	8-7	8-21	9-4	9-18	10-4
		Nymphs per 3-1 minute sucks							
Diazinon 2 G	4#/ac	8	0	0	1	2	0	30	48
Akton 1 G	4#/ac.	21	7	8	3	22	48	54	10
Ethion 5 G	3#/ac.	40	118	30	3	10	4	16	0
untreated check		23	123	189	143	53	56	7	0

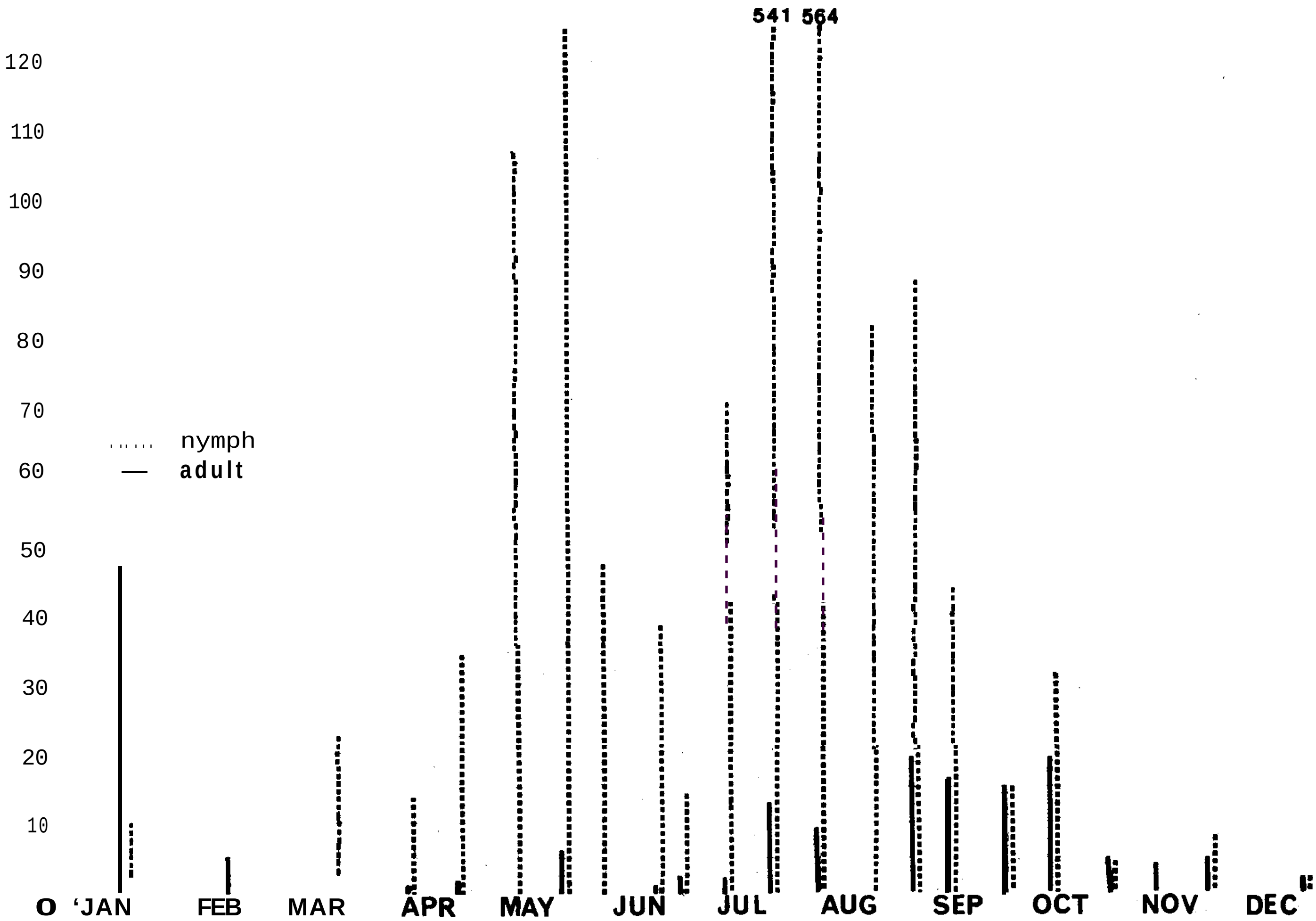
1810 nymphs and 91 eggs. In this area the adults were crawling but the npmphs were very difficult to see.

Tests indicate that this insect is not difficult to control. In one of the tests, all three materials used-Akton, diazinon and ethion-controlled the bug for two months. These materials were used as granules and applied at the rate of 4 pounds of the active ingredient per acre. After application the lawn was well watered. In the ethion plot the lawn was practically dead and by the end of two months, the lawn had started to come back and looked green. These tests were started in mid-June (Table 1) and the plots held their color for the duration of the tests. In another test, Dursban proved effective.

In summarizing the results, two applications of one of the granular materials will control the chinch bugs. Along with the insecticidal treatments, it should be stressed that good cultural practices, such as fertilizing, aeration or thatch removal and watering will help reduce the insect damage to the lawn as the pest seems to attack where the grass stand is the weakest.

Fig. 2 D-Vac *collecting equipment* →

Fig. 3 **Population of Southern Chinch Bug, *Blissus insularis* Barber in Whittier 1968**



HERBICIDE EVALUATIONS IN GROUND COVER PLANTINGS

C. L. ELMORE, W. A. HUMPHREY, A. H. LANGE, and T. KRETCHUN*

Chemical weed control in ground cover plantings has gained some degree of acceptance in the past few years. studies conducted in 1968 have shown that a number of herbicides provided acceptable weed control with little or no symptoms on the ground cover plants.

The plant species used were similar to the trial reported in California Turfgrass Culture, April, 1968. Uniform transplants grown from cuttings or seed at the South Coast Field Station (SCFS) were planted in both trials. *Gazania splendens* and *Verbena pulchella* were the species grown from seed. Five plants of most species were planted into each 10' x 30' plot. Four plants of Verbena pulchella and three plants each of *Pelargonium peltatum* and *Baccharis pilularis* were used per plot.

The locations and soil analysis are listed in Table 1 below

Pre- and postplant treatments were evaluated; mechanically incorporated preplant treatments included diphenamid (Enide® Dymid®) and EPTC (Eptam®) and postplant surface applications of trifluralin (Treflan®), diphenamid, dichlobenil (Casoron®) , nitralin (Planavin®) , DCPA (Dacthal®) and a combination of diphenamid-trifluralin followed by a one-half hour sprinkling. Each treatment was replicated four times. The ground cover species, herbicides, paplication rates, and results are given in Tables 2, 3, and 4.

Treatments were made at the South Coast Field Station on April 28 and May 5 respectively for the preplant and postplant treatments. The preplant treatments were incorporated to a depth of three inches with a tractor mounted rototiller immediately after application. The postplant treatments were applied and the area sprinkle irrigated immediately after application. The ground covers were planted April 29 and 30, 1968.

Preplant treatments were made May 17 at Davis and immediately incorporated to 11/2 to 2 inches depth in dry soil with a Howard Rotovator. Planting was done on June, 4, and 5 and the postemergence treatments were applied June 11. The area was then sprinkled. The postplant treatments were applied when some redroot pig-

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TABLE 1

	Soil Analysis			
University of California	**0. M.**	**Sand**	**Silt**	**Clay**
South Coast Field Station, Santa Ana	1.0%	57.0%	24.7%	18.3%
University of California, Davis	4.3%	25.2%	60.0%	14.8%

Table 2

GROUND COVER TOLERANCES TO POSTPLANT HERBICIDE TREATMENTS UNDER SPRINKLER IRRIGATION

CHEMICAL AND RATES AND LOCATIONS

GROUND COVERS	Diphenamid 16[1/]		Dichlobenil 4		Trifluralin 2		Trifluralin 4		Nitralin 2		Nitralin 4		DCPA 8		DCPA 16		Oiphenamid 1 + Trifluralin	
	SCFS	Davis	SCFS	Davis	SCFS	Davis	SCFS	Davis	SCFS	Davis	SCFS	Davis	SCFS	Davis	SCFS	Davis	SCFS	Davis
Baccharis pilularis	T*	T	T	S**	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Carpobrotus edul is	T	- -	I***	- -	T	- -	T	- -	T	- -	T	- -	T	- -	T	-	T	- -
Cerastium tomentosum	T	T	s	s	T	T	T	T	T	T	T	T	T		T	T	I	I
Delasperma alba	T	T	S	I	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Orosanthemum hispidum	I	I	s	s	T	T	T	T	T	T	T	T	T	T	T	I	T	T
Gazania splendens	T	I	s	s	T	T	T	T	T	T	1	T	T	T	T	T	T	T
Hedera canariensis	T	T	T	S	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Hedera helix	T	I	T	S	T	T	T	T	T	T	T	T	T	T	T	T	T	I
Hymenocyclus luteolus	I	I	s	s	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Osteospermum fruticos	T	T	I	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Pelargonium peltatum	T	I	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Sedum brevifolium	I	I	I	S	T	T	T	T	T	T	T	T	T	T	T	T	I	T
Sedum auatema lense	I	I	T	S	T	T	T	I	T	T	T	T	T	T	T	T	I	T
Verbena pulchella	I	T	s	s	T	T	I	T	T	T	T	I	S	I	S	i		T
Vin ca minor	T	T	I	I	T	T	T	T	T	T	T	T	T	T	I	I	T	T

1/ Numbers represent pounds 0' actuall ingreient per acre (AI/A)
* T = Tolerant at rate evaluatea
** S = Sensitive to herbicide at rate evaluated
** * I = Symptoms of injury initially with the plants recovering

Table 3

GROUND COVER TOLERANCE TO PREPLANT MECHANICAL INCORPORATED HERBICIDES

CHEMICALS, RATES, AND LOCATIONS

GROUND COVER	Diphenamid 8 1/ SCFS	Diphenamid 8 1/ Davis	Diphenamid 16 SCFS	Diphenamid 16 Davis	EPTC 4 SCFS	EPTC 4 Davis	EPTC 16 SCFS	EPTC 16 Davis
Baccharis pilularis	T*	T	T	T	T	T	T	T
Carpobrotus edulis (Ice plant)	I**	---	I	---	I	---	I	---
Cerastium tomentosum (Snow-in-summer)	S***	S	S	S	S	T	S	T
Delasperma alba (White trailing ice plant)	I	I	I	I	S	S	S	S
Drosanthemum hispidum (Rosea ice plant)	S	S	S	S	S	S	S	S
Gazania splendens	T	I	S	I	T	T	S	T
Hedera canariensis (Algerian ivy)	I	T	I	T	I	I	I	I
Hedera helix (English ivy)	T	T	T	T	I	I	I	I
Hymenocyclus luteolus (Yellow trailing ice plant)	S	I	S	I	S	S	S	S
Osteospermum fruticosum (Trailling African daisy)	I	T	I	I	T	I	I	I
Pelargonium peltatum (Ivygeranium)	I	T	S	I	S	S	S	S
Sedum brevifolium) (Green stone crop)	I	I	I	I	I	I	S	I
Sedum quatemalense (Brown bean)	T	T	I	I	I	T	S	I
Verbena pulchella (Sand verbena)	T	I	I	I	S	I	S	S
Vinca minor	T	T	T	T	S	S	S	S

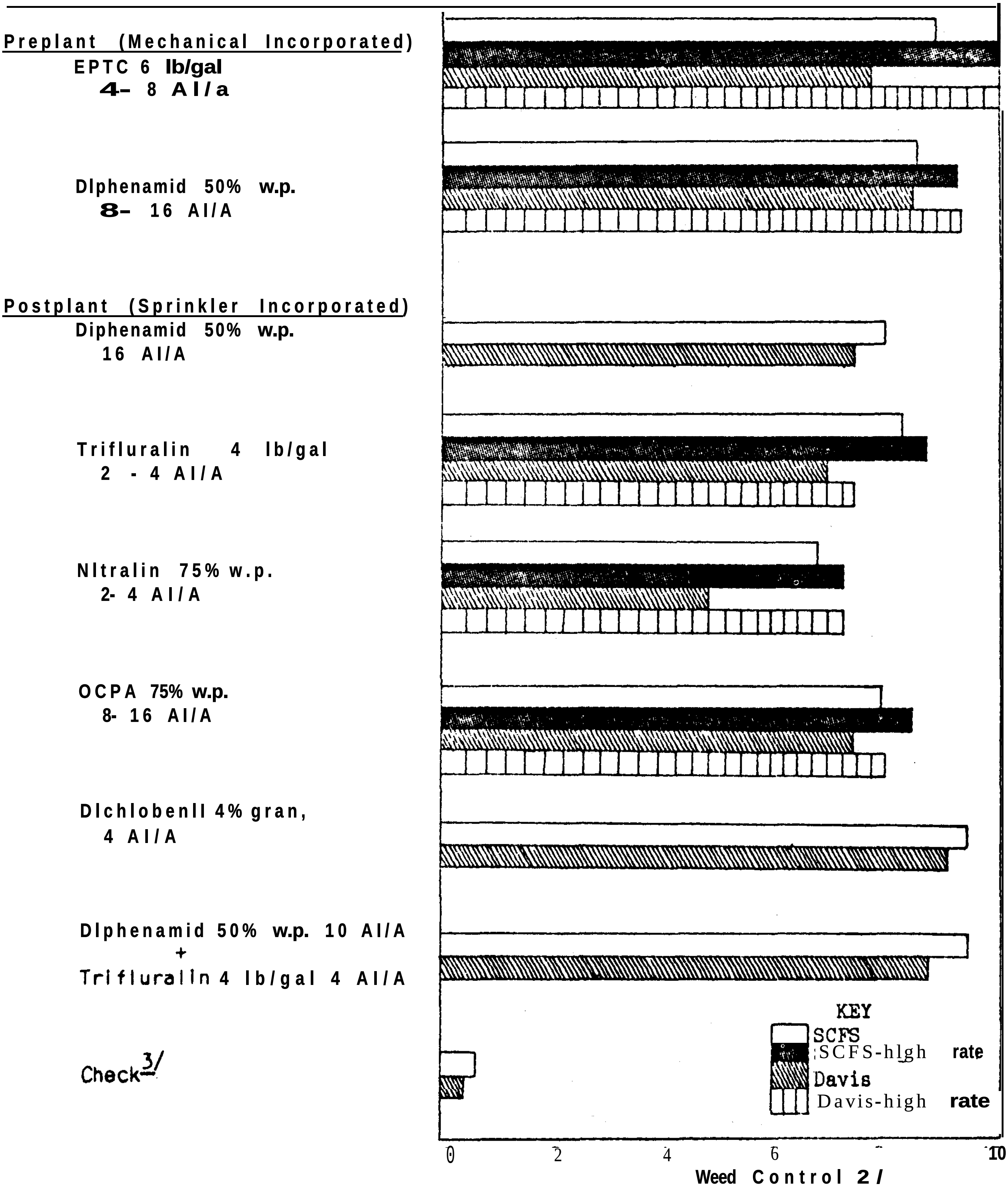
1/ Numbers represent pounds of actual ingredient per acre (AI/A)
* T = Tolerant at rate evaluated
** I = Symptoms of injury initially but with the plants recovering
*** S = Sensitive to herbicide at rate evaluated

Table 4

ANNUAL WEED CONTROL RESULTS COMPARING TREATMENTS, CHEMICALS, RATES, AND LOCATIONS

One Month Following Application

Chemicals, Formulations, Rates, and Treatments



1/ Numbers represent pounds of actual Ingredient per acre (AI/A).

2/ Summary of 4 replications from each location. Weed control based on visual ratings, 0 = no control, 10 = complete control.,

3/ Control values in check represent variation in weed population.

weed *Amaranthus retroflexus* plants were 1/2 to 1/4 inch in height.

No mechanical incorporation of the postplant treatments were used. However, sprinkler irrigation was utilized immediately after herbicide application to activate the postplant treatments. A total of seven inches per acre was applied within the first month after planting at the SCFS and for the period from planting through December, a total of 39 inches per acres of irrigation water was applied.

Periodic evaluations were susequently made on ground cover tolerances and on weed control as reported in the tables using the following keys: T=tolerant; I-symptoms of injury; S=sensitive, and weed control: 7=comercially acceptable control, 10=complete weed control. Weed species in the South Coast Field Station trial were: *Amaranthus retroflexus* (redroot pigweed), *Sonchus asper* (spiny sow thistle). Weed species in the Davis trial were: *Amaranthus retroflexus* (redroot pigweed), *Medicago hispida* (bur clover), *Amaranthus graeizans* (prostrate pigweed)

Chemicals evaluated in 1968 have given results comparable to those reported in the 1967 studies. Some additional chemicals were evaluated in the 1968 studies. A number of the ground covers showed symptoms of injury with EPTC used preplant incorporated. Further evaluation needs to be made on the use of granular EPTC post plant with sprinkler irrigation. A high level of weed control resulted in this' trial and in sprinkler trials not reported here. Five of the fifteen ground covers planted at SCFS showed symptoms of dichlobenil. At Davis only *two* of the fourteen escaped injury.

Most of the ground covers studied exhibited no symptoms from trifluralin, DCPA, or nitralin and fair to good weed control was observed. Only *Verbena pulchella* and *Vinca minor* showed somewhat less tolerance to these three herbicides.

GRASS BIOLOGY AND UTILIZATION SYMPOSIUM AT RIVERSIDE

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Tuesday, 8:00 a.m.-5:OO p.m.
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Thursday, 8:30 a.m.-12:OO noon
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For University, college and high school instructors in agriculture and biology; university researchers; agricultural extension specialists; industry staff in research and development; anyone interested in grass biology.

The purpose is to provide an in-depth survey of present knowledge in grass biology and a broader understanding of the important role of grasses in man's existence. Noted authorities will discuss fundamental aspects of grass genetics, morphology, physiology and ecology in relation to the use of grasses for turf, forage and rangelands, and describe most recent advances in the field.

1 Fee
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TUESDAY, MAY 20

Evolution of Grasses
Dr. G. Ledyard Stebbins, University of California, Davis
Ecotypic Variation in Grasses
Dr. Daniel Zohary, Hebrew University, Jerusalem, Israel
Distribution Patterns of Grasses in Relation to Evolution
Dr. B. Lennart Johnson, University of California, Riverside.
Breeding of Grasses
Dr. A. A. Hanson, Chief, Forage and Range Branch, Agricultural Research Service, USDA
Developing Superior Turf Varieties
Dr. John Long, Geneticist, 0. M. Scott and Sons, Marysville, Ohio
Selection and Breeding of Grasses for Forage and Other Uses
Dr. R. Merton Love, University of California, Davis
Seedling Vigor and Seedling Establishment
Dr. C. M. McKell, University of California, Riverside
Breeding for Seedling Vigor and Establishment
Dr. William Kneebone, University of Arizona, Tucson
Environmental Modification for Seedling Establishment
Dr. Carlton Herbel, Jornada Experimental Range, ARS, USDA, Las Cruces, New Mexico
Growth of Leaves and Tillers
Dr. Dov Koller, Hebrew University, Jerusalem, Israel
Growth Regulation of Grasses
Dr. J. R. Goodin, University of California, Riverside
External Factors Affecting Tiller Development
Dr. Horton M. Laude, University of California, Davis

WEDNESDAY, MAY 21

The Microclimate of Grass Communities
Dr. Thomas Denmead, CSIRO, Canberra, Australia
A Favorable Environment for Plant Pathogens-Grass Communities
Dr. Robert Endo, University of California, Riverside
Effects of Cultural Practices in Relation to Microclimate
Dr. James Watson, Toro Manufacturing Co., Minneapolis, Minnesota
Population Interactions, Diversity and Community Structure
Dr. Robert Loomis and Dr. Subdodh Jain, University of California, Davis
Competition Within the Grass Community
Dr. Raymond A. Evans and Dr. James A. Young, ARS, USDA, University of Nevada, Reno, Nevada
Soil Aeration and Gas Exchange in Relation to Grasses
Dr. Lewis Stolzy, University of California, Riverside
Soil Moisture Control for Maximum Grass Response
Dr. Daniel Hillel, Hebrew University, Rehovoth, Israel
Mineral Nutrition of Grasses: Why Grasses have Special Requirements
Dr. William E. Martin, University of California Agricultural Extension Service, University of California, Davis
Problems in Nutrient Availability and Toxicity
Dr. 0. R. Lunt, University of California, Los Angeles
Nutrient Uptake and Assimilation for Quality Turf vs. Maximum Vegetation Growth
Dr. Roy Goss, Washington State University, Puyallup Washington

Dinner: 6 p.m., Holiday Inn

NEW FRONTIERS IN RESEARCH

Speaker: Dr. Boysie Day, Associate Director, Citrus Research Center and Agricultural Experiment Statiop, University of California, Riverside

PLAYGROUND TURF

VICTOR B. YOUNGNER, University of California, Riverside

Special pleasure and relaxation are realized from recreational activities on turfed playgrounds and athletic fields. No concrete, black top or gravel play area can provide the satisfaction derived from a thick green turf. Unfortunately, many schools and playgrounds provide little or no grass play areas. This may be in part because of the difficulties often encountered in maintaining such areas.

Playgrounds and athletic fields of all kinds must be designed and constructed for frequent and hard use. The turf on such areas should be tough, wear-resistant, and able to recover quickly from injury. But these are not the only requirements of good playground turf. It must also provide a resilient cushion to reduce injuries from falls while at the same time providing sufficient firmness for good footing.

Good color is important but the grass should not be slippery or so soft and succulent that clothing is readily stained. If possible, growth and retention of green color throughout the seasons of use is desirable.

The ideal grass variety for a high quality playground turf would have the following characteristics: (1) Be deep rooted and drought tolerant, (2) be well adapted to the climate of the area, (3) be able to grow over a wide range of temperature, (4) have a heavy well developed rhizome system, (5) be free of disease and insect pests, (6) be able to grow under moderate fertility levels, (7) be able to grow in a variety of soil types and resist effects of soil compaction, (8) resist wear from foot traffic.

No grass variety in existence today meets all of these requirements, but in their areas of adaptation the best grasses for playgrounds, approximately in order of preference, are the following: (1) Bermudagrass-Santa Ana, Tifway, Tifgreen and common, (2) tall fescus-Alta, K-31 and Goar's, (3) Kentucky bluegrass, (4) perennial ryegrass, (5) meadow fescue.

However, no matter how good the grass variety, a satisfactory playground will be obtained only if the site is properly constructed and the turf is well maintained. Two of the most important steps for a good playground turf must be taken long before the turf is even planted. First, establish adequate drainage systems. In many cases this may mean tile drains for subsoil drainage. Surface drainage can be provided for by proper contouring of the surface, sloping the surface slightly to the edges of the play area and avoiding low spots. Unless this is done,

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THURSDAY, MAY 22

Physiology of Defoliation and Regrowth
Dr. V. B. Youngner, University of California, Riverside
Defoliation in Relation to Vegetative Growth
Dr. Don Hyder, ARS, USDA, Fort Collins, Colorado
Carbohydrate Reserves of Grasses
Dr. Dale Smith, University of Wisconsin, Madison
Inflorescence Induction and Development
Dr. Roy Sachs, University of California, Davis
Seed Production and Cultural Treatments
Dr. Ivar Johnson, Director of Research, Caladino, Woodland, California
Differentiation in the Grass Inflorescence
Dr. June Latting, University of California, Santa Cruz
Future Needs in Grass Research
Dr. A. A. Hanson, ARS, USDA, Beltsville, Maryland
Dr. Wesley Keller, ARS, USDA, Logan, Utah
Dr. James Watson, Toro Manufacturing Co., Minneapolis, Minnesota

COORDINATORS

Dr. Cyrus M. McKell, Professor and Chairman, Department of Agronomy, University of California, Riverside
Dr. Victor B. Youngner, Professor of Agronomy, University of California, Riverside

soft or muddy areas with a thin turf may be a constant future problem.

However, even if all this is done it will be of little value unless the soil is prepared to give it a good water infiltration rate. A slowly decomposable organic material such as redwood sawdust is often the best amendment to provide this porosity. A number of manufactured soil amendments, organic and inorganic, are also available and appear to do a good job.

On the established playground watering is one of the most critical maintenance practices for good turf over a long period of time. The old rule to provide water deeply while permitting the soil surface to dry between irrigations holds well for playgrounds. Turf wear is greatly increased if the soil surface is excessively wet when in use. Irrigations should be timed, if possible, to allow several hours between the end of the irrigation period and use of the playground.

Proper mowing height is important to give the necessary cushion without creating a danger of tripping players. The best height for bermudagrass is approximately three-quarters to one inch-the higher setting if use is very heavy.

Tall fescue, meadow fescue and perennial rygrass make the best turf if mowed at one to one and one-half inches. If clipped higher, they provide very poor footing. Bluegrass should not be cut lower than one and one-half inches in height.

One of the major problems on playground turf is soil compaction. The constant foot traffic quickly compacts the surface layer of soil even when well prepared and amended in the beginning. Deep watering then becomes difficult, oxygen supply to the roots is limited, and efficiency of fertilizer use is restricted. The result is a thin open turf and a hard playing surface.

Aerification is the only corrective measure possible short of renovation. This practice should be started before the soil becomes badly compacted and should be continued as a regular part of the management program. The number of annual aerifications will vary depending on many factors, but six times a year may not be too frequent.

A moderate nitrogen application rate is the key to good playground turf fertilization. If too little is used the turf will become thin and weak. If too much is used, especially when weather conditions are favorable for rapid growth, the grass will become soft and succulent. This will result in a slippery, quickly worn out turf and badly stained clothing.

Exact rates are dependent on many factors such as intensity of use, type of soil, and climatic conditions. However, as a starting rate, one-half to three-quarters of a pound of actualy nitrogen per 1,000 sq. ft. of area per month of growing season may be tried. Careful observation will show whether this should be increased or decreased. That rates should ever exceed one pound per 1,000 sq. ft. per month is doubtful.

One application annually of a complete fertilizer will usually take care of the phos horus and potassium needs. A 5:1:2 ratio on an annual bases is recommended. Iron as iron sulfate or as a chelate may be required occasionally.

Weeds may become a problem even in well maintained turf. They should be quickly eradicated as studies have shown that weeds greatly reduce the wear resistance of a turf.

Good herbicides are available today for the control of most turf weeds. However, two precautions should be noted. Apply all herbicides when turf use can be restricted for a day or two after application. Do not apply herbicides when weather conditions are unfavorable. High temperature may cause herbicide burn on the turf.

CALIFORNIA TURFGRASS CULTURE
Department of Agronomy, University of California
Riverside, California 92502
Editor, Dr. Victor B. Youngner

CALIFORNIA TURFGRASS CULTURE is sponsored by the Federated Turfgrass Council of California and is financed by the regional councils and other turfgrass organizations of the state. Subscription to this publication is through membership in one of the councils listed below.