Southern California Turfgrass Culture

JANUARY, 1958 VOLUME 8– NUMBER 1

KIKUYUGRASS, PENNISETUM CLANDESTINUM, AND ITS CONTROL

Victor B. Youngner
University of California at Los Angeles

Kikuyugrass, Pennisetum clandestinum, is native to eastern and southern Africa where it is extensively used as a herbage and turfgrass. It was introduced to this country twenty-five years or more ago and used in limited amounts in the sub-tropical parts of the United States for soil erosion control, athletic fields, golf course roughs and military installations. As far as is known, all plantings were by vegetative propagation. It has now spread to many other areas and is becoming a serious weed pest in southern and central California.

Kikuyugrass prefers full sun but will grow in moderate shade. While it will grow even in cool weather it does not appear to tolerate heavy frosts. In the arid parts of the country it will not become established nor persist long without irrigation. Therefore it is a weed pest primarily in irrigated fields, orchards, and turf.

Kikuyu is a coarse textured extremely vigorous grass with both rhizomes and stolons. Individual stolons may extend to several feet in length and may be as much as one-half inch thick. They have been observed running up fences and hedges to a length of over six feet. The rhizomes will often be found at a depth of four to six inches and may run below the soil surface for several feet before producing growth above ground. The flowers are inconspicuous, being almost entirely enclosed in the upper sheath of a very short culm. The flowering period extends throughout the warm season of the year with the flowering peak being in June and July in California.

The blades and sheaths are heavily pubescent and light green in color. The blades are long, folded and tapering to sharp pointed tips. Kikuyu is often mistaken for St. Augustine grass which it resembles only slightly. Many instances have been recorded where it has been planted for St. Augustine and even sold as such by nurseries. St. Augustine can be distinguished from Kikuyu by the following characteristics: Glabrous blades and sheaths, greatly compressed sheaths, parallel sided blades with rounded tips, and petioled collars.

Pennisetum clandestinum has been generally considered to be sterile, producing little or no seed. Observations of naturalized stands and pot-grown plants show that, to the contrary, it is often a heavy seed producer. Two general types of plants have been observed. One, a perfectly normal type, sets large numbers of seeds throughout the summer. Seed does not generally set on the second type unless it is in close vicinity to the normal. Large stands of this type have been examined in which no seeds could be found.

The seed is oval shaped, 1/16 to 1/8 inch in length, brown in color, hard and shiny. Generally the seed is retained in the sheath which surrounds the flower. It is thought that the seed may be spread by equipment, wind, golfers' shoes, and similar agencies. It is doubtful that birds are responsible for much spread. Mowing this grass, even quite closely as on golf course fairways, actually appears to increase the production of seed.

During 1957 eighteen different herbicides at various rates were screened for their herbicidal action on Kikuyu. Each treatment plot was 50 sq. ft. in size and replicated twice. The area used was a heavy stand of nearly pure kikuyu in full sun most of the day. The plots were observed for degree of immediate kill, amount of regrowth, and growth of new seedlings. The table below summarizes the observations on these plots.

Effective control of the kikuyugrass was obtained with only a few of the many herbicides tested. With one or two exceptions the best materials are those which are retained in the soil for a rather long time, thus preventing regrowth and destroying the seedlings as they germinate. This, of course, makes a long waiting period necessary before replanting with desirable grasses is possible. Dalapon, one of the best herbicides, appears to be about as effective at the low rates as at the higher.

Two applications of MH-40 destroyed all top growth but did not destroy the rhizomes or the seeds, thus permitting regrowth in a short time. However, it is probable that repeated applications of this material may be a very effective control since two applications

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EFFECTS OF VARIOUS HERBICIDES ON KIKUYUGRASS

HERBICIDE	RATE PER ACRE	NO. OF APPLI-CATION	PERCENT INITIAL KILL	REGROWTH AFTER 3 MONTHS	SEEDLING GROWTH	REMARKS
Amino Triazol	8 lbs.	1	25	Heavy	Numerous	Material may not be trans-located adequately to deep rhizomes
	8 "	2	50	"	"	
	10 "	1	25	"	"	
	10 "	2	50	"	"	
	12 "	1	50	"	"	
	12 "	2	75	"	"	
	16 "	1	50	"	"	
	16 "	2	50	"	"	
Dalapon (85% active)	8 lbs.	1	95	Slight	Few	Soil may be sterilized for 30 to 90 days or more
	8 "	2	98	"	"	
	12 "	1	90	"	"	
	12 "	2	98	"	"	
	16 "	1	95	"	"	
	16 "	2	98	"	"	
	25 "	1	95	"	"	
	25 "	2	100	None	"	
MH-30 (Maleic hydrazide)	2 gal.	1	10	Heavy	--	
	2 "	2	25	"	--	
	4 "	1	25	"	..	
	4 "	2	40	"	..	
	6 "	1	50	"	..	
	6 "	2	60	"	--	
	8 "	1	75	"	--	
	8 "	2	75	"	--	
MH-40 (Maleic hydrazide)	10 gal.	1	25	Heavy	Numerous	Repeated applications may be effective
	10 "	2	100	"	"	
	15 "	1	25	""	"	
	15 "	2	100	"	"	
	20 "	1	25	"	"	
	20 "	2	100	"	"	
	30 "	1	25	"	"	
	30 "	2	75	"	"	
Endothal	1 gal.	1	10	Heavy	..	Heavy regrowth prevented observations on new seedlings
	1 "	2	25	"	--	
	2 "	1	20	"	--	
	2 "	2	40	"	--	
Sodium TCA	12 lbs.	1	25	Moderate	Few	Soil will be temporarily sterilized
	12 "	2	50	"	"	
	16 "	1	50	"	"	
	16 "	2	75	"	"	
	25 "	1	50	"	"	
	25 "	2	80	"	"	

EFFECTS OF VARIOUS HERBICIDES ON KIKUYUGRASS
(CONTINUED)

HERBICIDE	RATE PER ACRE	NO. OF APPLI-CATION	PERCENT INITIAL KILL	REGROWTH AFTER 3 MONTHS	SEEDLING GROWTH	REMARKS
EPTC t Oil	6 lbs. 8 " 10 " 12 "	1 1 1 1	50 50 50 50	Heavy " " "	" -- " "	Heavy regrowth prevented observations on new seedlings. Effects appeared to be from oil only.
Disodium Methyl Arsonate (31.5% active)	34 lbs. 34 " 48 " 48 " 68 " 68 "	1 2 1 2 1 2	15 40 25 50 25 75	Heavy " " " " "	Numerous " " " " "	
Baron	80 gal.	1	95-100	None	None	A soil sterilant
Mylone	300 Ibs.	1	0	Complete	..	
Vapam	110 gal.	1	100	None	Numerous	
Dalapon t Amino Triazol	5 t 16 lbs.	1	85	Moderate	Numerous	Seedlings chlorotic
Chlorea	870 lbs.	1	95	Slight	None	A soil sterilant
Atlacide	1200 lbs.	1	100	None	None	A soil sterilant
CMU	5 lbs.	1	0	Complete	--	Heavier rates will sterilize soil
Benzac	20 gal.	1	25	Heavy	Numerous	
Weed-O-Kill	8 gal.	1	20	Heavy	..	
ACP M-406	40 lbs.	1	10	Heavy	..	

were greatly superior to only one. Several applications followed by a period of cultivation may also be a good method. The same methods may increase the effectiveness of the disodium methyl arsonate.

A single application of Vapam destroyed all top and subsurface growth but had little effect on the seed which germinated soon after the treatment. Vapam treatment followed by a period of cultivation to destroy the new seedlings may be one way to control this weed. Other field tests have substantiated this observation that the seed is not destroyed by a single Vapam treatment.

Baron, Chlorea and Atlacide which gave complete or nearly complete control are all soil sterilants which reduces their usefulness. These materials can be used only in open areas where immediate replanting is not planned.

Amino triazol alone did not control the kikuyu, but in combination with Dalapon it may be useful, since seedlings growing after this treatment were chlorotic and many perhaps did not survive. Several applications of this combination may be a useful control method, destroying both the existing growth and the new seedlings.

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KIKUYUGRASS, PENNISETUM CLANDESTINUM, AND ITS CONTROL

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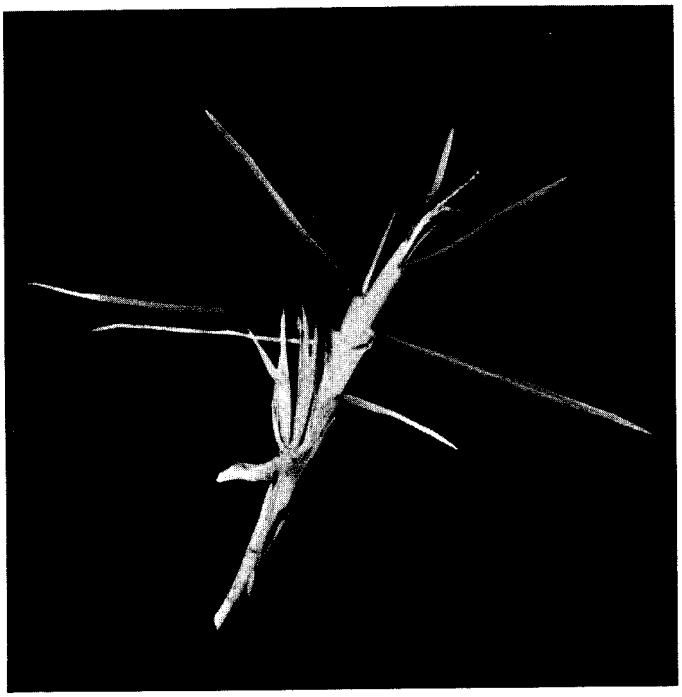

SHOOT OF KIKUYUGRASS SHOWING FLOWER ALMOST ENTIRELY ENCLOSED BY SHEATH AT TIP WITH ONLY THE STIGMA PROTRUDING. NEAR BASE OF SHOOT ARE SEVERAL SEEDS STILL RETAINED WITHIN THE SHEATH.

Most of the promising materials in this test are general weed killers and cannot be used safely near the trees and other ornamentals. Washing them into other areas must also be prevented. This danger may increase the value of such materials as MH-40 and disodium methyl arsonate which are not as effective but safer to use near other plantings.

Further studies will be on the effects of repeated applications, combinations of herbicides, methods and timing of application, combinations of herbicide applications and cultivation, control of new seedling growth, seeding habits and seed dissemination.

Footnote: ***These studies were supported in part by a grant from the National Golf Course Superintendents Association.***

In order that the information in our publications may be more intelligible, it is sometimes necessary to use trade names of products or equipment, rather than complicated descriptive or chemical identifications. In so doing it is unavoidable in some cases that similar products which are on the market under other trade names may not be cited. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.

RECENT GIFTS

Athletic and Recreational Turfgrass Association
3200.00

Monsanto Chemical Co.
Los Angeles
30 pounds Krillium

Jackson Manufacturing Company
Harrisburg, Pennsylvania
Lawn sprayer

0. E. Linck Company, Inc.
Clifton, New Jersey
2 liquid spreaders

Old Orchard Nurseries
Madison, Wisconsin
4 bags of bentgrass sprigs

0. M. Scott & Sons
Oakland, California
Fertilizer spreader

This publication "Southern California Turfgrass Culture" is sponsored by the Southern California Turfgrass Council and is currently financed through funds raised by the Southern California Golf Association. Communications should be sent to the Southern California Turfgrass Council, P. 0. Box 24054, Los Angeles 24, California, or to the editor, Dr. Victor B. Youngner, Department of Floriculture and Ornamental Horticulture, University of California, 300 Veteran Ave., Los Angeles 24, California.

GIBBERELLIC ACID ON ZOYSIA GRASSES

Victor B. Youngner
University of California at Los Angeles

Gibberellic acid is one of several similar growth promoting substances called gibberellins isolated from culture filtrates of the fungus *Gibberella fujikoroi.* This organism causes a disease of rice in Japan called "bakanae", characterized by an unnatural elongation of the shoots.

Early studies by a number of workers showed that these isolates would produce a rapid abnormal elongation of shoots and leaves in many plants at dilutions as low as one part per million.

Studies were conducted in the Department of Ornamental Horticulture at UCLA in 1957 to determine what practical value gibberellic acid might have in increasing the rate of establishment of grasses planted vegetatively. Zoysia was chosen for this purpose since it is notorious as a slow growing grass requiring a long period for establishment.

The first studies were on uniform size plugs of Emerald Zoysia planted in pots of pure sand in a greenhouse kept at 65° F. minimum. The plugs were watered daily with a complete nutrient solution. Approximately two weeks were allowed for the plugs to recover from the transplanting shock before treatments were begun.

The gibberellic acid treatments used were 0, 1, 10 and 100 parts per million. The applications were made by applying equal volumes of the solutions with a small atomizer which thoroughly wet all the foliage. All treatments were replicated four times. Measurements of the height of the grass were made at the five and seven week periods after the first treatment. The tops were also clipped at these times, and the clippings oven dried and weighed. Immediately after clipping, the plugs were again given the gibberellic acid treatments, making a total of three treatments during the experiment. Ten weeks after the start of the experiment the plugs were removed from the pots; the sand washed off the roots; tops and roots separated, oven dried and weighed.

Three days after the first treatment a pronounced increase in plant height was observed in the 100 parts per million treatment and to a lesser degree in the ten ppm treatment. This increase in height was accompanied by a lightening of the green color. As shown in the table, by the time of the first clipping, the plants treated with 10 and 100 ppm of gibberellic acid were significantly taller than the untreated. The plants receiving 100 ppm were significantly taller than all other treatments. This same increase in height was observed at the time of the second clipping. One ppm of gibberellic acid had no significant effect on top growth.

No treatment produced a significant increase in horizontal spread over the check during the course of the experiment. At the time the plugs were removed from the pots all were still essentially the same diameter as at the time of planting.

All concentrations of gibberellic acid significantly increased the dry weight of clippings over the untreated as shown in the table below. None of the treatments had any effect on the dry weight of the roots produced during the time the experiment lasted. It is possible that additional gibberellic acid treatments over a longer period of time might significantly increase or decrease the weight of the dried roots.

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EFFECTS OF GIBBERELLIC ACID TREATMENTS ON EMERALD ZOYSIA GROWTH

TREATMENT	MEAN HEIGHT AT 1ST CLIPPING INCHES	MEAN HEIGHT AT 2ND CLIPPING INCHES	MEAN TOTAL DRY WEIGHT OF CLIPPINGS GRAMS	MEAN TOTAL DRY WEIGHT OF ROOTS GRAMS
Check - no G. A.	1.50	2.13	6.72	4.27
1 ppm G. A.	1.63	2.50	7.90	5.93
10 ppm G.A.	1.94	2.94	7.93	6.05
100 ppm G. A.	4.38	4.00	9.64	5.40
L.S.D. at 5% probability level	0.58	0.32	1.11	2.21

GIBBERELLIC ACID ON ZOYSIA GRASSES

(CONTINUED FROM PAGE 5)

Field plantings were established in the summer of 1957 to further test the effects of gibberellic acid on Zoysia. Three Zoysias were used, Meyer strain of Z. japonica and two selections of Z. matrella. The planting material was washed in water to remove all soil. Half of this material was then dipped in a 100 ppm solution of gibberellic acid and half was untreated. Planting was by uniformly spaced sprigs.

All the sprigs turned brown after planting and showed no new growth for approximately two weeks. New growth appeared first in the plots from the untreated materials of all varieties and could be clearly seen throughout before any appeared on the plots from the treated material. Early growth was lighter green on treated material than on the untreated, despite regular applications of nitrogen. The gibberellic acid appeared to have reduced the percent survival of the sprigs slightly.

The effects of this initial injury and growth retardation was evident throughout the summer. The plots planted with the untreated material had a higher percent cover than the treated by the time low fall temperatures stopped growth.

These studies showed that treating Zoysia planting material with gibberellic acid will not improve the rate of turf establishment. The increased top growth demonstrated in the greenhouse studies may be little value as far as turf is concerned.

NEW TURFGRASS CULTURE COURSE AT U.C.L.A.

A new course on the "Taxonomy, Ecology and Management of Turfgrasses" has been added to the list of courses offered by the Department of Floriculture and Ornamental Horticulture at U.C.L.A. It is open to graduate students and undergraduates of advanced standing. The instructor will be Dr. Victor B. Youngner, Assistant Professor of Ornamental Horticulture.

The undergraduate student in Agriculture at U.C.L.A. may now select a course of study leading to a B.S. degree in Ornamental Horticulture, specializing in turfgrass management. This specialization will prepare him for the many job opportunities to be found throughout the state in turfgrass culture and related fields.

Graduate instruction in turfgrass management leading to the M.S. and Ph.D. degrees has been offered by the Department of Floriculture and Ornamental Horticulture for several years. A number of advanced degrees have been granted during this period.

The addition of this course is another step in the development at U.C.L.A. of a major western center for research and. instruction in turfgrass management.

FEDERATED COUNCIL MEETS

Federated Turfgrass Council of California met in Los Angeles on Tuesday afternoon, October 15th, in conjunction with the Southern California Turfgrass Institute. Members discussed the research needs of the turfgrass industry in California and endorsed a statement of these research needs that had been prepared at the annual meeting held at San Francisco on July 9, 1957.

Information was given the Council that Dr. P. A. Miller of the Department of Plant Pathology at Los Angeles plans to retire January 31, 1958. The Council took action congratulating Dr. Miller on his long and fruitful career in the field of turfgrass in California and extended their best wishes to him and Mrs. Miller in his retirement.

The Council also took action to continue the splendid work which Dr. Miller has been carrying on by authorizing two committees to discuss with Dr. Paul Sharp of Berkeley, Director of the California Agricultural Experiment Station, and Dr. John T. Middleton of Riverside, Chairman of the Department of Plant Pathology, the need for continuing research work in the field of turfgrass pathology throughout the state and urging that they give consideration to finding a man who could continue this field of research.

COLORANTS FOR DORMANT BERMUDA AND OTHER SUBTROPICAL GRASSES

Victor B. Youngner and Tosb Fucbigami
University of California, Los Angeles

Colorants or dyes have been used to a limited extent for many years to color dormant grasses during the winter season. Most of the old materials lasted for only a short time, being readily faded by sunlight or washed out by rain. Recently a number of new colorants have been developed by the chemical industry which are designed to last through the dormant seaspn. Several of these have been tested at UCLA during the fall of 1957.

The materials were applied to dry but not dormant bermudagrass contaminated with maturing crabgrass. All applications were made according to the manufacturers' recommendations. Regular watering practices were followed after allowing an initial period for thorough drying of the dyes. The turf was not mowed during the period of observation. Presented in the table below are the observations made on the materials tested at UCLA. Others may be on the market but have not been tested as yet.

EVALUATION OF FIVE COLORANTS FOR DORMANT TURF

MATERIAL	MANUFACTURER	COLOR 2 DAYS AFTER APPLICATION	AMOUNTOFRUBOFF AFTER DRYING	COLOR 2 WEEKS AFTER APPLICATION	COLOR 8 WEEKS AFTER APPLICATION
1. Dow's M-819	Dow Chemical Co. Midland, N. J.	Dark green. Similar to color of darkest green turf grasses	Very slight	Good, slight loss. Slightly blue color	Fair to poor
2. Green Plasma	Midland Chemical co., N.Y., N.Y.	Poor. Pale blue green	Very slight	Very poor. Only trace of blue color remaining	No color remaining
3. Green Stuff	Kreiger Color & Chemical Co., Los Angeles	Bright green. Similar to color of many common turf grasses	Very slight	Good. No change	Good to fair
4. Greenzit	W. A. Cleary Co., New Brunswick, N. J.	Medium blue green	Very slight	Fair. Blue green	Poor. Very blue
5. Stayz-Green	0. E. Linck Co., Clifton, N. J.	Dark green. Similar to color of darkest green turf grasses	Slight	Good, slight loss of color	Fair to poor

COLORANTSFORDORMANTBERMUDA AND OTHER SUBTROPICAL GRASSES

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These new products may very well find a permanent place in turfgrass management. They offer one solution to the problem of brown winter lawns in the southwest. They may also' be used to color turf killed by disease until replanting is possible, or turf which has temporarily turned brown from lack of water.

Ten weeks was the maximum length of time any of the materials lasted. However, these tests were on grass which was still making some growth. A considerably longer period of color retention should be obtained from most of these materials if applied to dormant turfgrass.

Several facts about the use of these colorants must be emphasized. First, though your grass is not growing it still needs some moisture. During prolonged periods of low rainfall occasional waterings should be given the turf. This point may be easily overlooked since the colored grass may look quite fresh and green. Secondly, apply only enough material to thoroughly and uniformly cover the grass with a minimum of run-off. Excess solution running off, the grass into the soil is wasted. Finally, as with any product, only buy colorants made by a reliable company. Beware of fantastic advertising claims. The good materials are designed for only one purpose, to quickly and economically color discolored turf until new growth begins. This is all that a dependable manufacturer will claim to do.

EXTENSION COURSE IN TURFGRASS CULTURE

The University Extension Course in Turfgrass Culture will be offered again next spring semester. Organization of the course will be similar to the one given last spring. All aspects of turf management will be covered, including grass varieties, soils, turfgrass fertilization, watering, turfgrass diseases and insects, weeds and weed control. The class will meet Tuesday evenings from 7:00 to 9:30 for twelve weeks, starting February 11, 1958. The class will meet at the University of California Ornamental Horticulture Area, 300 Veteran Avenue, Los Angeles. It will be open to anyone interested in the culture of turfgrasses, but it is planned especially for the professional. There will be a charge of $18.00 for the twelve-week course. The instructor will be Dr. Victor B. Youngner, Assistant Professor of Ornamental Horticulture, UCLA.

Students may register in advance at the University Extension Office on the UCLA campus, or they may register at the time of the first meeting.

THE SOUTHERN CALIFORNIA TURFGRASS COUNCIL

The Southern California Turfgrass Council was incorporated as a non-profit organization in 1957. This organization is to have a board of nine directors elected each year by the general council membership. This board of directors will in turn elect the officers for the year from its membership. The new officers for 1958 are as follows: Bob Berlin, President; Frank Stewart, Vice President and Program Chairman; Max Weeks, Secretary; and Harold Syverson, Treasurer.

Membership will continue to be in three classes.

1. Individual membership which is open to all persons interested in turfgrass culture and management. Dues: $3.00 annually.

2. Membership for non-profit organizations which would apply to such organizations as the Southern California Golf Course Superintendents Association, Lawn Bowling Association, Athletic and Recreational Turfgrass Association, Seed Trade Association, etc. Dues: $10.00 annually.

3. The commercial membership which is for those profit organizations which derive business from turfgrass. Companies selling sprinklers, seed, insecticides, fungicides, herbicides, equipment, etc. come under this classification. Also included would be organizations performing services for a fee, such as spray chemical companies. These commercial organizations should join under this classification, even though they may be members of a non-profit organization which in turn is a member under classification number 2. Dues: $25.00 annually.

It is hoped that the year 1958 will have a larger membership in all three classifications than ever before. It is the desire of the Council to establish fellowships, scholarships and research grants in turfgrass culture. This can be done only with the support of the individuals and organizations interested in this field.

The Council now has a permanent mailing address as follows:

Southern California Turfgrass Council
P. 0. Box 24054

Los Angeles 24, California

The 1957 officers extend their sincere thanks to all members for their willing cooperation during the past year and ask that this same support be given the new officers in 1958.