USGA Report from Colorado
EXECUTIVE SUMMARY

Development of improved strains of three native or adapted grasses for reduced inputs or problem soils is reaching final stages at Colorado State University. Production of Breeder's Seed of two or more strains of each of three grasses was successful in 1992, with larger quantities expected in the 1993 harvest. These grasses are alkaligrass, Puccinellia distans, blue grama, Bouteloua gracilis, and fairway created wheatgrass, Agropyron cristatum. In each case we have watched turf performance over several seasons at Fort Collins, CO, partly from earlier formulations. We also have some information from cooperators in other states.

Alkaligrass has interesting responses to seasons: the best items from Eurasian introduction are greener in fall and spring, even in winter, than the cultivar Fults, and do not have as much rust susceptibility here. In midsummer our materials tend to go more dormant because of heat, even if watered well, whereas Fults is often best in summer unless it gets leaf spot. All of them tolerate 0.75 or 1.5 inch mowing height, and possess great salt-tolerance, but in the absence of salt they cannot compare (or compete) with Kentucky bluegrass. Excellence of turf color has been sought in a final nursery of 12 families of 180 plants, which after rogueing will provide definitive seed in summer 1993. Late summer seed of 1992 in small quantities has been harvested. Rust incidence in the families ranged from 5 to 13 (with 20 indicating every plant in a row rusted). This is not a lethal disease and plants go into winter with many new healthy green leaves. Our plants have been selected for more perenniality; 3 successive years of harvest.

Blue grama is the dominant native warm-season rangegrass of the Great Plains, and our selections have been made for seed yield, seed size, and good turf appearance. It is a low maintenance grass and maintains attractive color from May to early October, and even in dormancy. Summer color of our Elite and Plus synthetics, based on 25 and 24 clones respectively, is darker green than the range cultivars Hachita and Alma, and our strains have better winter color, though they go dormant a little sooner. Two minor strains named Nice and Narrow (leaf), have been hard to multiply and lack adequate turf data, but Elite is in quantity seed production and ready to commercialize.

Fairway crested wheatgrass, native to Eurasia, is well adapted to northern and western regions of N. America, and is drought tolerant and low maintenance. It would be more adapted to roughs although golf courses exist in the Dakotas and Montana with fairways of this grass, which prefers cutting height over 1 inch. Our strains Gray and Red are more rhizomatous, disease resistant, and differ in leaf width, Red being narrow-leaved. Each has been produced in two forms, diploid and tetraploid. Two of these four crossing blocks have to be moved to a new Agricultural Center in April 1993 but this allows eliminating mediocre parents and doubling replication of the rest, to raise more Breeder's Seed.

1992 USGA Annual Report (Colorado)

A. BREEDING PLOTS

1) Alkaligrass

This salt-tolerant but not particularly drought-tolerant grass has advanced to the stage where industry participation is being sought for further multiplication and testing.

Yields of alkaligrass seed from the 49-plant blocks of western U.S. collected "natives" were reported in the interim report of 1 May 92, and ranged from 200 to 522 g. Their germination percent varied from 36 to 86% with one stock, no. 69, having only 5% germination. Except for no. 57, which has shown good color performance in our turf trials, these western collections do not seem to be as useful as the Eurasian types.

In view of problems getting thick-enough stands we re-tested the germination of the seedlots of 2, 14, 15, 17, 18, and 57 that we have sent to several cooperators. All were above 82% both in blotter germination at 21 days, and in greenhouse germination planted at 1 cm in soil in flats. This 1989-90 seed is still available for test upon request. It is still apparent that Eurasian sources 2, 14, 17, and 20 in the June 1990 test have the best color in spring and fall, being strikingly greener in late October.

The alkaligrass final Breeder's Seed nursery was planted in May 1992 with 12 families which included the ten listed in Table 1 of 1991 report, and two other possibles, in light of the need to broaden the germplasm base. Evidence from Oregon is that families behave differently to the rust strains there, than they do in Fort Collins, so a broader set of selections, which are suitable in other respects, would serve the nationwide use of this grass. The 12 families each had 9 replications of 20 progeny plants so that 180 are growing from each family, and 2160 plants in all. Also we planted 96 plants of each of families 22 and 23 which were listed as 'Prostrate' and 'Compact', respectively.

The new nursery was maintained with cultivation, hoeing and irrigation so that it produced some late-season seed in this first year, which was harvested by families (yield about 150 g per family) in early September; the plants were clipped again in mid-October to remove possible seed

contamination. Also in September all plants were scored for absence or presence of rust pustules. Probably the greater humidity we have had in late summer favored the spread of the disease, and the families showed significant differences in rust incidence (Table 1), which was more noticeable on these spaced plants than on the turf plots. However, in late October most plants in this nursery have considerable healthy green growth going into the winter. Table 1 gives the rust incidence by family as a mean for each plot, as well as turf ratings. If all 20 plants were infected, the score would be 20, so even the best family (#9) has a quarter of its progeny infected. Next spring serious rogueing will be done - if rusted plants are still alive they will be clipped or dug out, and also any other undesirable types whether for leaf width or color. Then the nursery will be harvested by families or as a bulk depending on the strategy decided between us and a cooperating seed company.

2) Blue Grama

This native grass has proven in our turf tests and in plantings by others to be an excellent warm season turfgrass that can maintain a pleasant color with a minimum of irrigation. Although its green season is shorter than a cool-season turf, it will fill an industry need for a low maintenance and slow growing turfgrass. Efforts were made this year to care for and to maximize the seed harvest from four isolated seed production nurseries. These nurseries consist of the most advanced individual plants that were selected for their desirable characteristics and are designated as Elite, Plus, Nice and Narrow. The selection criteria were detailed in Tables 2 and 3 of the 1990 annual report, and are repeated here for convenience.

Elite was selected as a group of 25 clones that had good heading (more seed potential), good spikelet fertility, and high caryopsis weight (Table 2). Plus is recombining the next best group of 24 clones with acceptable to good fertility and caryopsis weight. The Plus group was rechecked in 1990 seed samples and the fertility was considerably higher than in 1989 (Table 2). This year-to-year variation is typical of blue grama. The Nice group consists of vegetatively attractive clones that could enhance turf quality, but are not as good as the other two in seed traits. We hope that 1992 seed is sufficient to make an adequate turf test to supplement the July 1991 tiny plots of Nice.

All four seed harvests were accomplished by bulking each of the clones across all its replications, in order that the seed from any undesirable clones could be later subtracted from the entire harvest. For example elite clone 7 has never grown very well and dead ramets in the nursery were not replaced. Some clones are several days earlier, with shorter culms, but this might be desirable for genetic diversity.

Table 1. Alkaligrass Breeder's Seed nursery rust ratings, with quality ratings (total of 3 reps.) from turf plots in 1991 and 1992.

Fam.		Parentage	Rust 9-92	Turf Quality Totals 8-91	10-91	7-92	10-92
2	2	2-3-3	9.3	15	14	17	17
3	2	3-11-1	11.8	17	16	16	17
8	14	3-12-5	9.4	16	15	19	17
9	14	5-11-1	5.0	18	17	19	19
11	14	9-11-3	8.9	15	16	16	18
12	15	3-8-1	12.9	18	15	19	17
13	15	6-4-2	10.0	16	15	17	17
14	17	3-9-4	9.5	16	17	17	17
15	17	4-10-3	9.3	16	15	17	17
16	18	1-9-4	8.7	15	15	19	18
18	18	4-5-5	11.7	15	15	17	16
19	18	6-2-2	10.1	16	16	18	15
22	Prostrate[1/]		5.7	15	16	17	17
23	Compact[1/]		7.2	14	16	17	16

[1/] These were located at one end of the nursery and not in the randomized blocks so their low rust score may not be strictly comparable.

Table 2. Traits of blue grama plants multiplied in four recombination blocks.

Group name	No. clones	No. reps.	1989 seed data Crude yield	1989 seed data fert %	1989 seed data Cary wt.	1990 seed data Crude yield	1990 seed data fert-ility	1990 seed data Cary wt.	1991 seed crude
			g/pl	%	mg	g/pl	%	mg	g
Elite	25	62	19.8	6.8	51	-	-	-	500
Plus	24	4	19.5	4.1	46	18.0	9.6	48	5
Nice	8	3	14.8	4.0	41	15.2	10.3	43	1
Narrow	12	3	NH	-	-	NH	(2.4)	(40)	1

Elite was not processed for fertility or caryopsis weight from the 1990 crop to allow maximum stock for turf test (FC-91). Virtually all 1991 yield from the new recombination was devoted to the Mead NE turf test.

Narrow plants were too small in 1989 to be samples for seed traits, most were cut off in 1990 to eliminate their pollen contamination of Elite and Plus seed parents.

In addition to these four groups, a nursery of 216 progeny plants from the Nice group was maintained and the best 30 plants for seed bearing were harvested this September. None of these five harvests has been cleaned at report time, but the Elite nursery of 1550 plants grew vigorously this year and the harvest appears to have been of substantial size. Actual harvest amounts will not be known until processing is completed, and at this time we can decide if further turf testing of any bulk is warranted or if the seed should be consigned for immediate exclusive release to industry, as a licensed turf-type blue grama.

The move of the Agronomy field research center from its present Rigden Farm to its new location this winter is requiring the transplanting of some valuable and desirable plants. This is being accomplished by cloning and moving all the 8 Nice and 6 of the 12 Narrow plants from those blue grama nurseries to the greenhouse. The Elite block and the Plus block are already in safe farm plots.

3) Fairway crested wheatgrass

Two polycross recombination blocks which were transplanted in early 1981 for narrow-leaf types (code name Red) rhizomatous diploid and tetraploid, gave much more seed in Aug. 1992 than

1991, as hoped. The other two blocks for "Gray" non-narrow, rhizomatous diploid and tetraploids, were transplanted in late 1991 to the South Farm and established well, so that good seed harvest was also obtained in August-September, 1992. The 1992 seed has not yet been processed, but details on the 1991 crop are given in Table 3. The "gray" group of clones were then still single plants in the nursery and were harvested as individuals (60 out of 83 tetraploids, and 30 out of 39 diploids). The single plant yields were

Table 3. Fairway crested wheatgrass 1991 seed characters.

Group name	No. clones	No. reps.	Seed yield per pl. Mean	Seed yield per pl. Range	Hundred seed wt. Mean	Hundred seed wt. Range	Seed stock
			g		mg		g
2x gray	30	4	19.6	(2.9-59.3)	232	(152-330)	0[1/]
4x gray	60	4	15.6	(2.5-70.2)	250	(150-340)	19.4[1/]
2x red	21	3	0.2[2/]	--	205	--	15.3
4x red	27	3	0.2[2/]	--	193	--	15.7

1/ after distributing seed for turf plots at Fort Collins CO and Madison WI. There is also a breeding reserve (2g/pl).

2/ mid-spring transplants, yielded very poorly in 1991.

quite variable, and also the hundred-seed weights. In fact it is quite possible that the original diploid/tetraploid distinction has become blurred during two generations of cross-pollination. Attempts to clear up this confusion are continuing.

The 1992 behavior of the nursery plants has been followed through the season, paying attention to the leaf color, leaf width, growth traits, and leaf diseases. A few clones in all four groups appear sub-standard, and their seed will be excluded form the bulk made up from the individual plant harvests. Many of the growth traits are recognizably uniform among the 4 ramets of a clone, and

scores for leaf and stem diseases tend to be somewhat heritable also, so that it will be wise to eliminate the clones most susceptible to such diseases. Many plants in the original nursery (not the crossing blocks) were found to be suffering from symptoms of an unidentified virus, which is not seed-borne.

The clump disease which is some form of foot-rot causes plants to open out at the center and lodge to either side, making harvest awkward by hand and very difficult by machine. All clones put into recombinations were grade 1 and 2 for this disease, i.e., quite resistant compared to grades 4 and 5 which were lodged flat and had necrotic centers. In 1992 some of the ramets of the resistant plants showed grade 3 symptoms during the seed bearing period, but in October the centers have filled in with fresh leafy growth. This is not believed to be a problem for turf stands
as it does not show any difference in turf quality between progeny of grade 2 and grade 4 but it is one to avoid for seed production fields. The etiology is unknown as it was not possible to isolate any fungal or bacterial pathogen. Fusarium and Helminthosporium come in as secondary invaders but cannot by themselves cause this disease.

Because of the loss of the Rigden Farm by the University, it was necessary to move the Red (narrow) group clones to the greenhouse over 92/93 winter, as the new North Agricultural Campus is not yet ready to receive new plantings. If possible, we will also rescue a larger quantity of these clones from the Rigden Farm (if not yet subdivided) for transplant before April 15. In that way the new Red recombination blocks could be larger and ready to produce large seed amounts of Breeders seed.

B. TURF PLOTS

1) Alkaligrass

USGA Alkaligrass Trial (Established June 1990)

1992 TURFGRASS QUALITY RATINGS (1 = poor; 6 = acceptable; 9 = excellent)						
Accession	May	June	July	August	Sept.	Oct.
2	7.7	7.7	7.3	7	8	8.7
6	7.3	7.7	6.7	6	7	7.3
14	8	7.7	6.7	6.7	8	8.3
17	8	7.3	7	7	8.3	9
20	7.7	8	7.7	7	7.7	8.7
26	6	6.3	7.7	8	7.3	6.7
57	8	7.7	7	7	8	8.3
71	6.3	6.7	7.7	8	7.7	6.7
74	7.3	7.7	8	7.7	7	7
81	7.3	7	7.3	7	7	7.3
87	6.3	6.3	8	7.7	7	6.7
93	7	7.3	7.7	7.7	7.3	7.7
LSD(0.05)	1.1	1.3	1.2	1.5	NS	0.9

There was no discernable response to nitrogen (2 vs. 4 lbs N/1000 square feet per year), probably because the entire study was fertilized with 6 lbs. of N in summer/fall of 1991 to improve density and vigor. Much of the 1991 N carried over into 1992, thus masking any N response. Work with 'Fults' does show a response as you go from 2 lbs. N per season to about 5 lbs. N per year.

Short mowing heights (3/4" to 1") increase quality during spring and fall by about 0.5 rating point, mainly because of the increased shoot density observed at the lower height (as compared to density at 1.5 inches). However, these quality gains are lost during the warmer summer months (July and August) as heat stress causes extensive leaf discoloration, as well as an increase in the amount

of leafspot on all cultivars. Good quality should be maintainable under low heights in areas where summer heat stress is minimal.

Accessions 2, 14, 17, 20, and 57 provide the best spring and fall quality, and display only minimal quality declines in July and August. These experimentals perform as well as does 'Fults' if maintained with adequate moisture (1 to 1.5 inches per week) during periods of maximum water demand, as well as with N levels of 2 to 4 lbs. N per growing season. They appear to respond favorably to late-season fertilization.

Under conditions of minimal salinity stress (6-10 mmhos/cm in the soil) they are not competitive with perennial ryegrass, tall fescue, and even Kentucky bluegrass. This species is also easily invaded by dandelion, spurge, foxtail, and crabgrass if it is not managed to produce a dense turf. Alkaligrass appears to tolerate pendimethalin and trifluralin/benefin preemergent products at the highest label rates (3 lbs. ai/A). Postemergent herbicides that appear to be tolerated well include: triclopyr, clopyralid, and 2,4-D (amine formulations, at low end label rates).

USGA Alkaligrass Trial (Established October 1990)

1992 TURFGRASS QUALITY RATINGS (1 = poor; 6 = acceptable; 9 = excellent)						
Family	May		August		October	
	Low*	High*	Low	High	Low	High
1	6.3	6	6.7	5.7	6.7	6.3
2	6.7	6.7	7.7	6.3	7	6.7
3	7.3	7	7.7	6.7	7	7
4	6	6	6.3	6	6	6
5	6	5.7	7.7	6.7	7	6.7
6	6	6	6.7	6	6.3	6.7
7	6.7	6.3	6.3	6	6.3	6
8	7	7	7	6	7	7
9	7.7	7	7.7	6	8.3	8
10	6.7	6	7	6.7	7	6.3

(cont.)

11	7	7	6.7	6	7	7
12	7	7	7.7	6.3	7.7	7
13	7.3	7	7.7	7	7.3	7
14	7.3	7	7.7	6.7	7	6.7
15	6.3	6.3	6.7	6	6.3	6
16	7	7	7.3	6.3	7	7
17	5.7	5	7	6	6	6
18	6.3	6	6.7	6	6	6.3
19	6	6	6	6	6.7	6
20	6	6	6.7	5.7	6.7	6.3
21	6.7	7	7	7	7	7.3
22	7.3	7	6.3	6	7.7	7.3
23	6	6	6.7	6	6	5.7
24	5.7	5.7	7	6.3	6	6.7
25	5	5	5	4.7	5.7	5
26	5	5.3	5.7	5	4.7	4.7
27	4.7	5	4.7	4	5.3	5
28	6	5	6.7	6	4	4.3
29	5	5	5.7	5	4.7	4
Fults	6.7	6	7.7	7.3	6	5
LSD (0.05)	1.1	1.2	0.9	1.1	1.3	1.2

*High (1.5) and low (0.75) mowing heights.

This latter alkaligrass trial indicated that alkaligrass performs better under lower mowing heights. In fact, during the summer, the low-cut plots were noticeably greener (and denser) than the high-cut plots. It is possible that the lower mowing height reduced leaf area, thus reducing water loss from the plants. Another contributing factor might be the quality of cut, since the low-cut turf was mowed with a reel-type mower, and a rotary was used for the high-cut plots. Alkaligrass possesses a tough leaf blade, similar to that of a fine fescue. The higher-cut turf also appeared to be more susceptible to leafspot than the adjacent lower-cut turf.

The best-performing families, year-around, were: 3, 8, 9, 11, 12, 13, 14, 15, 16, 19, and 22. These families performed as well as, or better than (during some periods of the year), 'Fults', and they are all represented in the advanced Breeder's Seed plot described in A(1).

2) Blue grama

USGA Blue Grama Trial (Established July 1991)

1992 TURFGRASS QUALITY RATINGS (1 = poor; 6 = acceptable; 9 = excellent)				
	June	July	August	September
Hachita	7	7	7	6
Hachita (caryopsis)	5.3	6	6.7	6
Alma	7	7	7	6
Elite	7	8	8.3	4
Plus	7	7.7	8	3.7
Grade 6	6.7	7	7.7	4
LSD (0.05)	1.3	1.4	1.1	1.7

The blue gramas grow out of winter/spring dormancy around mid-May. Hachita and Alma display greater shoot growth rates than do Elite, Plus, and Grade 6. The experimentals also display a darker blue-green color than do Alma and Hachita. The texture and density of the experimentals are also better than that of Alma and Hachita. All of the entries display good drought resistance, to be expected with this species.

Blue grama, including all entries in this study, appears to tolerate the preemergent pendimethalin without any phytotoxicity or other visible negative effects. Postemergent applications of triclopyr and clopyralid appear safe on this species, when used at labeled rates.

The Elite, Plus, and Grade 6 enter dormancy earlier in the fall than do Hachita and Alma. However, the dormant color of the 3 turf-types is a more pleasant brown or golden color, while that of Alma and Hachita is a decidedly less-attractive gray, after passing through a yellowish green phase.

Except for the tendency to become dormant a bit earlier in the fall, Elite and Plus demonstrate

noticeably better turf characteristics than do the rangeland varieties, Alma and Hachita. The turf-types possess darker green color during the growing season, more attractive dormant coloration, better density, finer texture, and a less rapid vertical growth rate. This, combined with its rapid germination and establishment rate, makes blue grama an interesting and viable alternative to (or companion with) buffalograss.

3) Fairway crested wheatgrass

USGA Wheatgrass Trial (Established September 1991)

1992 TURFGRASS QUALITY RATINGS (1 = poor; 6 = acceptable; 9 = excellent)						
Group or Variety	May	June	July	August	Sept.	Oct.
Blue tetraploid	7	7.3	7	7.7	8.3	8
Red/pink diploid bulked	7	7	7	8	8	7.7
Green diploid	7.3	7	7.3	7	7.3	7.3
Gray	6.7	6.3	7.3	8	7.3	7
Blue diploid	7	7.3	7.3	7.7	8	8
Green tetraploid	7	7	7.3	7	7	7
Ruff	7	6.7	7	6.3	7	6.7
Hycrest	7	7	7.3	7	7	7
Ephraim	6.7	7	7	7.3	7	7
LSD(0.05)	ns	ns	ns	1.2	1	1.1

Crested wheatgrass is one of the earliest-greening of the turfgrass species in the late winter and spring. It retains this attractive color until drought-stressed, whereupon it quickly becomes dormant. Supplemental irrigation rapidly restores growth, density, and color. It appears to be more sensitive to drought than Kentucky bluegrass, perennial ryegrass, and tall fescue. This sensitivity to drought was likely developed to allow for survival under extended dryness under unirrigated rangeland conditions, but the present test has not been drought stressed in 1992.

Most of the experimental groups in this planting possess an attractive dark green coloration; this contrasts sharply with the yellow-green color of Ruff. Ephraim and Hycrest are darker green than Ruff, but do not possess the finer leaf texture and better density of some of the experimental groups.

The "red/pink" diploid possesses narrower leaves, resulting in a denser appearance. It also displays a greater tendency towards rhizome production. The 'Gray' experimental also is finer in texture, and appears to be more rhizomatous in nature. The 'Blue' and'Green' materials were harvested from plants in 1990 having grade 3 and 4 clump disease, so this susceptibility does not carry over to turf performance. It is an undesirable trait in seed production.

C. COOPERATIVE STUDIES

Buffalograss. This study, planted with plugs in June 1990, has matured nicely in the two years since planting. The varieties 378 and 315 provide the best color (darker green or blue-green), finest texture, greatest density, and slowest vertical growth rate of all entries. They are also aggressive stolon producers. 304 and 409 are less dense than the previous entries, and display a more rapid vertical growth rate. These two, along with 609, are noticeably darker green than Prairie. The Prairie, 609, 304, and 409 are less aggressive in filling in open areas and in preventing weed invasion than 315 or 378.

Prairie, 609, 304, and 409 lose color more slowly (2-3 weeks later) in the fall than do 315 and 378. 609 displays some green shoot growth long after all others have become dormant. The early dormant coloration of 315 and 378 is a very attractive pinkish/bronze color; this changes to a golden brown later in the fall. 609 also develops an attractive golden color during dormancy.

Bermudagrass. The experimental bermudagrasses from Oklahoma State University (established June 1990) continue to perform very well in Fort Collins. They appear to be very winter hardy, suffering little or no obvious winter die-back through two winters here. These are very aggressive selections (90-1, 90-2, 90-3, and 90-4), producing numerous stolons and rhizomes. This trial is situated adjacent to the USGA buffalograss trial, and receives the same amount of irrigation that the buffalograss does. If anything, the bermudagrass appears to be more drought-resistant than the buffalograss. All selections are dark green in color; texture is a bit coarse, but would likely be finer if the plots were mowed at a lower height (currently 1.5 inches). The success of this study encouraged us to participate in the NTEP bermudagrass trial program this year (one planting in Fort Collins, another on the Western Slope in Grand Junction.

D. OUTSTATE TRIALS

Alkaligrass trials in Ames, Iowa and Champaign, Illinois have given disappointing results both in both keeping density and competitiveness against weeds. The test at Ames had problems with germination (despite the fact that seed tested well in section A.1) and stands were not quite thick enough or adequate to give solid color ratings, though 2, 14, 18, and 57 were a little greener than Fults.

In Champaign the late spring color of the experimentals was not as attractive as Fults, and by midsummer all entries were swamped with broadleaf weeds in a fertile and overmoist soil (13" rain in one month!!). Tom Voigt says Champaign is not the right environment for alkaligrass, but mentioned the need for this grass on the Chicago area toll road shoulders, because of salt loads. We need to arrange such a test, probably via cooperating seed industry channels. Loft's has some plots in NJ.

On the seed production front, tests at Lebanon OR by Virginia Lehman exhibited the contrast in rust reaction already mentioned, with experimentals more susceptible than Fults. Our materials are taller in culm height in June 92, being from 80 to 100 cm, with Fults only 72 cm. Seed yields have not been reported, for these alkaligrasses in Oregon.

Blue grama seeded at Mead NE by Terry Riordan showed approximately the same behavior as in Fort Collins, with Grade 6 and Plus being darker green in summer yet earlier to go dormant (fairly brown on September 25 when Hachita and Alma had green regrowth since being cut just before the site visit by Mike Kenna). Elite was supplied as 117 g (per plot) of partially processed 1991 seed in mid-June during RLC's visit to Mead. Pressure of work and lack of assistants prevented it from being planted so it is scheduled for spring 1993.

Fairway crested wheatgrass (FCWG) at Brookings SD was managed by David Graper (RLC saw these plots on Oct. 1, 1991) and had established well, going into the 1992 mowing season. Further detail is unavailable at present.

A set of material sent to Madison WI included seed of Gray diploid, Gray tetraploid, and three check varieties, and was planted by Tom Salaiz in the new O.J. Noer turfgrass facility of the University of Wisconsin. Because the irrigation system was not ready till late June (1992) they decided on September planting which has come up well to a thick stand, with expected color differences. They are excited over the possibility that FCWG may be more winterhardy than tall fescue or perennial ryegrass.

E. COMMERCIALIZATION

Contacts are being made with about 15 turfgrass seed companies relative to the potential exclusive license for final development, widespread testing and release to the market of one or two alkaligrass strains, the Elite blue grama, and one or two types of fairway crested wheatgrass. Three separate companies, one for each species, would probably be the successful finalists, but we will pay most attention to the ability of the company to do the most successful development (including quantity seed production) and marketing.