Florona Stargrass

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SUMMARY

Description. - 'Florona' stargrass *(Cynodon nlemfuensis* Vanderyst var. *nlemfuensis* 'Florona') is a perennial grass which spreads by stolons (horizontal above ground stems) forming a moderately open sod with clumps of erect stems giving a bunch effect.

Adaptability. - Well adapted to south Florida flatwoods, but will not tolerate long periods of flooding. This tropical grass should not be planted north of Orlando because of low temperatures.

Planting. - Vegetatively propagated from above ground stems (sprigs).

Fertilization. - Has a high fertility requirement, similar to other stargrasses and bermudagrasses.

Forage Quality. - Digestibility is slightly lower than Florico stargrass but about equal to Ona stargrass.

Insects. - Susceptible to both armyworms and grass loopers.

Disease. - Foliar blight caused by *Rhizoctonia solani* Kuhn, AG-1, was observed on plants in small plots adjacent to other stargrass and bermudagrasses during September of 1983.

Nematodes. - Plants were found to support ectoparasitic nematodes such as stubby-root and sheath species.

IMPORTANT CHARACTERISTICS

Advantages

1. Two-year daily gain of 0.9 lb and a liveweight gain of 590 lb/A at a stocking rate of 3 yearling steers/A.
2. Extremely persistent with proper management.
3. Dry matter yield averaged about 11% to 15% higher than Ona stargrass, with forage quality about equal to Ona.
4. Makes excellent growth in late fall (October to November) and spring (April to May) under drought stress conditions, when adequately fertilized.
5. Nutritious when harvested or grazed every 4 to 5 weeks.
6. Rapid establishment from vegetative cuttings.
7. Hay cures rapidly during favorable weather conditions.

Disadvantages

1. Requires higher fertility than limpograss, digitgrass and bahiagrass.
2. Forage quality drops rapidly after 6 weeks of growth and following a heavy frost.
3. Top growth easily killed by frost.
4. High HCN-p for about a 4-week period following heavy N fertilization (100 lb/A) anytime during the growing season.
5. Should not be grown north of Orlando in Florida or where temperatures drop below 20° to 25°F (-6.7° to -3.9 °C).
6. Vegetatively propagated from stem cuttings.

INTRODUCTION

'Florona' stargrass *(Cynodon nlemfuensis* Vanderyst var. *nlemfuensis* 'Florona') is a long-lived, persistent perennial grass adapted to many south Florida flatwoods soils. This tropical grass is cold sensitive and should not be planted north of Orlando or where temperatures drop below 20 ° to 25 °F. This vegetatively planted grass (sprigs) establishes rapidly in clean seed beds free from common bermudagrass (C. *daclylon* (L.) Pers.). Once established, Florona is very persistent and competes well with common bermudagrass when properly managed. Florona, like most other

stargrasses and bermudagrasses, has a high fertility requirement; therefore, an intensive grazing system must be practiced to obtain maximum utilization of the forage. Dry matter production of this grass is slightly higher than that of 'Florico' and 'Ona' stargrasses (C. *nlemfuensis* Vanderyst var. *nlemfuensis);* however, forage digestibility is lower than Florico and about equal to Ona stargrass. Florona stargrass matures rapidly; therefore, grazing frequency (rest period between grazing) should not extend beyond 4 or 5 weeks. When Florona is managed properly, animal daily gain and liveweight gain/A has been similar to Ona stargrass. This grass, like Florico and Ona stargrasses, carries a high hydrocyanic acid potential (HCN-p), especially when high levels of nitrogen are applied.

Florona has been selected primarily because of its extremely good persistence, high dry matter yields, and ability to produce forage earlier in the spring than Florico. Its production is more uniform throughout the growing season than either Florico or Ona stargrass.

ORIGIN

In 1973 Florona was observed growing in a 'Pensacola' bahiagrass *(Paspalum notatum* Fluegge.) pasture at the Agricultural Research and Education Center (AREC) in Ona, Florida. Dr. E. M. Hodges, Professor Emeritus, AREC, Ona, recalls this area of the research center to have supported a sugarcane *(Saccharum sp.)* planting, followed by a limpograss *(Hemarthria altissima* (Poir.) Stapf and C. E. Hubb.) increase planting. Stargrass was never observed in either planting. It is not known how this grass originated at this location.

In 1974, several Florona plants were removed from the bahiagrass pasture and replanted in a nursery. In 1975, additional plants were removed from the bahiagrass pasture and replanted in a replicated mob-grazing study.

DESCRIPTION

Florona is a long-lived perennial, of the genus *Cynodon.* It is a stoloniferous, tufted grass with erect stems which lack rhizomes. Unless heavily fertilized, it forms a relatively open sod in a mature stand. Stems are 1.0 to 2.8 mm in diameter and 24 to 34 inches tall. Leaf sheaths are glabrous (no hairs). Ligules consist of a membrane to 0.2 mm long and are fringed with hairs to 0.1 mm long. Leafblades are 2 to 5 mm wide and 5 to 11.5 cm long, stiff, and glabrous on the lower surface with scattered hairs on the upper surface. The inflorescence (seedhead) of 4 to 7 spike-like branches 4 to 6.5 cm long is arranged in a whorl at the tip, often with 1 or 2 branches just below. Spikelets are 2.2 to 2.6 mm long.

Inflorescence production is profuse in spring and fall in south-central Florida. Few if any seeds are produced, and propagation is entirely vegetative. Plant appearance varies widely with stage of growth and Florona stargrass cannot be distinguished visually with any certainty from a number of other stargrasses. Therefore, the only way to be certain of a variety is by obtaining planting sprigs from a known source.

RESEARCH

Forage Yield and Quality

Northcentral and Northwest Florida

Plots of Florona stargrass were established in the summer of 1986 at Brooksville, Gainesville, Quincy, and Jay, Florida. At each location Florona stargrass was compared with standard cultivars presently available to commercial growers. Standard cultivars that have performed well at northcentral and northwest Florida locations are 'Tifton 44', 'Coastal' and 'Tifton 78' bermudagrasses (C. *daclylon).*

Florona established slowly during the fall of 1986 and spring of 1987, partly because of cooler temperatures in these regions of the state. Dry matter (DM) yields at three of the four locations were low when compared to standard commercial cultivars. Florona established well in Gainesville and yielded 6.6 t/A one year after planting (Table 1). However, even at the Gainesville location, Florona yielded 15% and 20% less than Coastal and 'Coastcross 1' bermudagrass (C. *daclylon),* respectively. Records reveal temperatures at the above locations fall below 20°F on an average of once every 2 years. Florona appears to provide no advantage for growers in northcentral or northwest Florida.

Table 1. Dry matter (DM) yield, crude protein and in vitro organic matter digestion (IVOMD) of commercial *Cynodon* grasses one year after establishment at Gainesville, 1987.

Grass entry	Total seasonal yield	Crude protein	IVOMD
	tons DM/acre	%	%
Coastal bermudagrass	7.8	10.7	57.3
Tifton 44 bermudagrass	5.7	10.8	61.0
Tifton 78 bermudagrass	6.9	12.3	62.3
Grazer bermudagrass	5.8	11.7	67.2
Coastcross-1 bermudagrass	8.2	10.6	63.2
Florona stargrass	6.6	12.5	62.2

SFREC, Immokalee

Plot studies conducted by Kalmbacher et al. (4(Numbers in parentheses refer to literature cited.)) at the South Florida Research and Education Center (SFREC) in Immokalee, indicated Florona stargrass yielded about the same as Florico stargrass, with a four-year average of 4.8 t DM/A (Table 2). These DM yields are about 55% higher than those from Ona stargrass. The limpograss cultivars yielded about 3.0 t DM/A/yr more than Florona at Immokalee. In vitro organic matter digestion (IVOMD) was generally higher for 'Floralta' limpograss throughout the year; however, Florona had a higher percentage of crude protein (CP) (Table 2). Caution must be used in comparing these quality indicators, since they represent only one year's data. Floralta also was more persistent, allowing less encroachment of common bermudagrass than all other entries tested. Although data from this one experiment indicated Florona had no advantage over Floralta limpograss at the Immokalee location, commercial growers in this area should still establish small plantings of Florona on various soil types to determine whether it is adaptable to their specific situation.

AREC, Ona

Mob-grazing.-Florona stargrass was established in a mob-grazing experiment in 1975 along with 'Pangola' digitgrass *(Digitaria decumbens* Stent), Pensacola bahiagrass, and 13 other grass entries to study the effect of the grazing animal on DM yield, forage quality, and persistence (5). Each grass was grazed at 2-, 3-, 4-, 5-, and 7-week grazing frequencies from May through November over a 3-year period. Grasses were fertilized with 220 lb/A N, 50 lb/A P_2O_5, and 100 lb/A K_2O per year. Dry matter yields of Florona increased as the interval between grazing increased from 2 weeks (4.5 t/A) to 7 weeks (8.9 t/A) (Table 3). Average DM yield of Florona across grazing frequencies was 6.1 t/A, which was about an 11% increase above Ona stargrass.

Table 2. Dry matter (DM) yield over 4 years of clipping, crude protein (CP) (1982) and in vitro organic matter digestion (IVOMD) (1982) of grass entries tested at Immokalee.

	Year					Season (1982)							
Grass entry	1981	1982	1983	1984	Avg	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
	---------- yield, tons DM/acre ----------					---------- CP,% ----------				---------- IVOMD, % ---------			
Floralta limpograss	10.5	9.0	7.0	5.1	7.9	7.8	9.9	6.1	4.6	54	63	56	54
Florona stargrass	6.7	6.6	4.0	1.8	4.8	10.8	11.0	7.9	6.9	43	63	47	42
Florico stargrass	5.3	6.9	4.1	2.3	4.7	8.4	10.9	8.3	6.1	46	64	54	47
Ona stargrass	4.4	4.5	3.4	0.0	3.1	(b)	10.1	7.6	6.3	(b)	62	48	46
Taiwan digitgrass	5.4	6.2	4.8	2.8	4.8	(b)	9.8	7.2	6.0	(b)	65	52	49
Survenola digitgrass	(a)	4.5	3.9	2.0	2.6	8.1	10.4	6.5	7.8	49	69	57	50

Source: Modified from Kalmbacher et al., (1987).

(a) Entry not established in 1981.

(b) Entries had not resumed growth.

Table 3. Dry matter (DM tons/acre) yields of grasses mob-grazed at five grazing frequencies, Ona, 1976-1978.

	Grazing frequency (weeks)				
Grass entry	2	3	4	5	7
Florona stargrass	4.5	5.4	5.1	6.6	8.9
Florico stargrass	3.4	4.3	4.8	6.6	9.1
McCaleb stargrass	3.9	4.7	4.2	5.7	8.0
Ona stargrass	4.4	4.9	3.8	6.7	7.6
Pensacola bahiagrass	4.5	4.1	3.5	4.4	4.7
Pangola digitgrass	2.2	2.2	2.7	3.1	5.8

Crude protein concentration and IVOMD of Florona stargrass declined as grazing frequency was delayed from 2 weeks (16% CP and 62% IVOMD) to 7 weeks (8% CP and 44% IVOMD) for forage grazed in June (6) (Table 4). In August there was a drastic decline in CP from 18% for the 2-week grazing frequency to 10% for the 7-week frequency. During September the IVOMD followed a similar pattern, dropping from 59% to 47% for the 2- and 7-week grazing frequency, respectively.

The CP content of Florona stargrass forage is similar to that of Ona and Florico stargrasses. However, IVOMD of Florona is about 3 percentage units lower than that of Florico and about equal to that of Ona stargrass. Digestibility of all stargrasses is quite poor if grazing or harvest frequency is delayed beyond 5 weeks.

Table 4. Crude protein (CP) and in vitro organic matter digestion (IVOMD) of several grasses grazed in June at different grazing frequencies in a mob-grazed study, Ona, 1976-1977.						
	Grazing frequency (weeks)					
Grass entry	2	3	4	5	7	Avg
	----------% CP----------					
Florona stargrass	16	14	12	11	8	12
McCaleb stargrass	17	13	12	11	8	12
Ona stargrass	17	14	13	11	8	13
Pangola digitgrass	15	15	11	13	8	12
Pensacola bahiagrass	14	13	11	10	7	11
	IVOMD					
Florona stargrass	62	59	51	51	44	53
McCaleb stargrass	61	61	55	54	46	55
Ona stargrass	64	61	55	52	45	55
Pangola digitgrass	68	68	59	60	53	61
Pensacola bahiagrass	57	57	52	52	47	53

Grazing management. - A 3-year grazing management study was conducted to determine the proper stubble height and plant height above the stubble needed to optimize forage yield, quality, and persistence. Florona stargrass was compared with Ona stargrass. Results indicated that stubble height had little effect on forage yield or quality, but plant height above the stubble was an important factor for both grasses. Florona stargrass was very persistent and produced good yields of quality forage when stubble height was 6 to 10 inches and plant height above the stubble was 6 to 18 inches. Florona stargrass is one of the most persistent stargrasses tested at Ona.

Small pasture grazing. - A grazing study comparing Florona stargrass with Florico and Callie hybrid was conducted from May to December of 1986 and 1987 at the AREC in Ona. The fertility program on these pastures was 175-47-95 lb/A N-P_2O_5-K_2O annually, plus 18 lb/A of a micronutrient mix IPI 303(2. IPI 303 contains the following elemental content: iron, 18%; zinc, 7.0%; manganese, 7.5%; copper, 3.0%; boron, 3.0%; and molybdenum, 0.2%.). Nitrogen was applied in four uniform applications (March, May, July, and September); P_2O_5 and K_2O were

applied once annually in January. Each pasture unit was divided into three equal parts, allowing 2-weeks' grazing and 4-weeks' regrowth. The stocking rate was four yearling steers per 1.25 acres. Average weight of steers in 1986 was 466 lb and 543 lb in 1987. Cattle had free access to mineral supplement(3. Guaranteed analysis of mineral supplement: Ca > 12.0%, P > 12.0%, NaCl > 26.0%, Fe > 1.0%, Cu > 0.13%, Co > 0.03%, Mn > 0.05%, Zn > 0.10%, F < 0.18%, Vit. A 200,000 U.S.P. units/lb.) throughout the grazing study. Florona was more productive under dry spring and early summer conditions than either Ona or Florico stargrasses. It had a 2-year average carrying capacity of 636 steer days/A over 208 grazing days (Table 5). Average daily gain on Florona stargrass was 0.9 lb/day with a total seasonal liveweight gain of 590 Ib/A.(4. Personal communication with Mr. Asamoah Larbi, 1987, University of Florida.)

This average daily gain was slightly less than the 1.0 lb/day obtained by Hodges et al. (3) with Ona stargrass during the warm season. However, due to the higher carrying capacity of Florona, liveweight gain/acre was 13% higher than Ona stargrass.

Table 5. Average daily gain, carrying capacity, and liveweight gain per acre on three *Cynodon* grasses averaged over 2 years, AREC, Ona, 1986 and 1987.

Grass	Average daily gain	Carrying capacity	Total liveweight gain
	lb/day	steer days/acre	lb/acre
Florona	0.9	636	590
Florico	1.2	598	720
Callie hybrid(a)	0.8	556	461

(a) Experimental entry

INSECTS, NEMATODES, AND DISEASE

Insects

The two-lined spittlebug *Prosapia bicincla* (Say), has been found on Florona stargrass but did not appear to cause any serious damage. However, if signs of spittlebug were evident, spring burning (January or February) of the previous year's stubble is one of the best control measures.

The striped grass looper, *Mocis latipes* (Guene'e), and fall armyworm, *(Spodoptera frugiperda* (J.E. Smith)), both will feed on Florona stargrass and can destroy the entire crop if not controlled. In fact, if worms attack a stargrass field in early December, followed by a heavy frost in late December or January, this could put extra stress on plants, resulting in weakened plants by spring. Florona stargrass should be monitored for armyworms from mid-June and loopers from

mid-August to early November.

Nematodes

Continued growth of perennial grasses on sandy flatwood soils may be conducive to the development of economically damaging populations of phytoparasitic nematodes. Population levels and dominance of specific nematode genera depend on grass variety. This is the result not only of grass suitability as a host for nematodes, but also of competition among nematode species for feeding sites on plant roots and the vigor of the plant fed upon by each nematode species.

Florona stargrass along with Pensacola, 'Argentine' and 'Paraguay 22' bahiagrasses was found to support many plant parasitic nematodes. These were basically found growing on Eau Gallie fine sand (sandy, siliceous, hyperthermic Alfic Haplaquod) and Pomona fine sand (sandy, siliceous, hyperthermic Ultic Haplaquod) at the AREC in Ona. Although population estimates were made periodically in pastures involving stargrasses and bahiagrasses, no conclusions can be drawn concerning production damage by the nematodes. Since no production of the grasses in the absence of nematodes has been measured, there is no way to determine the amount of damage caused to the stargrass by the nematode. The importance of these data currently lies in the potential use of these grasses in land intended eventually for other crops such as vegetables or ornamentals, for which the pathogenicity of several nematodes such as *Dolichodorus* on celery *(Apium dulce* Mill.) and tomato *(Lycopersicon esculentum* Mill.) (8), *Trichodorus* on corn *(Zea mays L.) (2),* and *Tylenchorhynchus* on azalea *(Rhododendron* sp.) (1), are well documented. By knowing what nematodes are found in association with these stargrasses, commercial growers can determine if present day stargrass fields can be renovated safely for vegetable or ornamental production without fear of their crop being damaged by nematodes. Future work on pasture grasses also may indicate an economic need to consider nematode pathogenicity to pastures.

Nematode community composition and population densities vary tremendously when pastures are established on poorly drained soil (Table 6). Kinds of nematodes and their population levels depend on previous history of the field, native cover, soil type, and water table management. Relatively low number of individuals as compared to annual row crops may be explained by the quality of water control in the two cultures. Nematodes are encouraged in well-drained soil; nematodes of pastures on flatwood soils may fluctuate significantly with the water table during the year. Therefore it is better to determine nematode assays of perennial grasses for their compatibility in rotations during the dry season.

Table 6. A comparison of nematode population estimates in pastures at several ages of Florona and Ona stargrasses with Argentine, Paraguay 22, and Pensacola bahiagrasses.

	Age	Nematodes/150 ml soil						
Cultivar	(yr)	Tr(a)	He	Hm	Hmc	Ty	Do	Ho
Florona	3	55	0	29	33	0	0	0
	4	2	397	1050	0	10	58	6

	7	37	13	5	0	45	40	0
	8	23	9	97	64	0	0	0
	9	13	15	77	69	0	0	0
Ona	4	15	13	212	0	169	53	8
	8	43	6	18	0	242	21	0
Argentine bahia	9	10	2	4	2	0	0	0
Paraguay 22 bahia	9	7	17	2	1	0	0	0
Pensacola bahia	4	9	743	118	0	26	24	2
	7	16	10	1	0	44	10	0
a Tr = Trichodorus, stubby root; He = Helicotylenchus, spiral;								
Hm = Hemicycliophora, sheath; Hmc = Hemicriconemoides, ring;								
Ty = Tylenchorhynchus, stunt; Do = Dolichodorus, awl;								
Ho = Hoplolaimus, lance.								

Disease

A 'leaf blight' disease *(Rhizoctonia solani* Kuhn, AG-1) (7) has been found on Florona stargrass in grazing studies during August and September 1983 at Ona, Florida. Grazing Florona stargrass under a continuous system back to a 6- to 10-inch stubble, or under a rotational system with a 4-week grazing interval, revealed no foliar blight. The incidence of blight seemed to be associated with dense stands of tall, uncut, ungrazed forage and tended to disappear after October 15. Cattle consumed infected plants relatively well with no signs of rejection. Since this disease appeared only once in 6 years, it does not appear to be of economic importance. No other diseases of significance have been noted on Florona stargrass.

PRODUCTION AND MANAGEMENT

Establishment

Florona stargrass is established vegetatively from stolons (runners) or mature stem pieces. When placed in a moist, firm seed bed, nodes sprout in 5 to 10 days. Freshly harvested planting material (1000 lb/A) is distributed on clean cultivated soil, covered by disking 2 to 4 inches deep or by covering about 75% of each stem with soil, followed by an **extremely** firm packing. Freshly harvested planting material must be disked into the seed bed immediately after distribution to prevent drying of plant material.

To successfully establish this stargrass, the seed bed must be clean (free of common bermudagrass and all other vegetation) and moist. If the history of a field indicates common bermudagrass as a problem, the planting rate should be increased to 1500 lb/A. The more uniformly planting material is spread across the field, the better the stand of stargrass.

Lime and Fertilizer

Soil test results should be used in determining fertilizer and lime requirements. The stargrass fertilization program should be divided into two parts - establishment fertilization and maintenance fertilization.

Establishment fertilization

Most of the south Florida flatwood soils are deficient in plant nutrients, therefore Florona stargrass needs to be fertilized soon after planting. When new tillers (shoots) are approximately 1 to 3 inches tall, fertilize with about 35-35-35 lb/A N-P_2O_5-K_2O plus micronutrients, if needed. About 30 days after the initial application, plants should receive an additional 30 to 40 lb/A N when fields are not water-saturated. This establishment fertilizer should not replace the normal fall application. Florona stargrass tends to grow well within a pH range of 5.5 to 6.5 with available calcium at 1000 to 1200 lb/A.

Maintenance Fertilization

All stargrasses require a high fertility level. Under an intensive grazing program established Florona stargrass should receive 56-28-56 lb/A N-P_2O_5-K_2O (unless otherwise indicated by soil test), three times per year. If the stargrass is harvested for hay about 70-70-70 lb/A N-P_2O_5-K_2O should be applied 4 to 6 weeks before each cutting If micronutrients have not been applied within 3 to 4 years or the stargrass is planted on new land (recently developed from the native condition) about 20 lb/A IPI 303 or equivalent may be required. The above fertilization should be adequate to produce about 2 t/A hay after 5 weeks' regrowth, provided suitable environmental conditions occur.

Management and Utilization

Clipping and grazing studies have demonstrated that Florona stargrass should be allowed a rest period of 4 to 5 weeks between grazing or clipping. If the rest period is shorter, forage quality increases, but persistence of the stand decreases. If the rest period is increased to 7 weeks, persistence could improve, but crude protein and digestibility are relatively low.

Hay

Making Florona stargrass hay must be both timely and intensive to produce a good quality product. If 7 weeks or more are allowed between hay harvests, the quality will be low and cattle may reject considerable amounts. Commercial growers must manage all stargrasses on a timely basis (4- to 5-week regrowth period). Florona stargrass cut for hay should be allowed a 4- to 6-inch stubble for better persistence. A spring (May to June) harvest of hay can be made easily, provided cattle are removed by April 1 and the grass is well fertilized as indicated previously. Since this grass will make substantial growth from September through November, cattle can be

removed September 1, followed by heavy fertilization (provided there is no surface water on fields) and harvested for hay in mid-October. All dates and rates of fertilizer may require adjustment to meet weather and soil fertility variables.

Grazing

Florona stargrass has persisted well under grazing provided a stubble height of 6 to 10 inches is maintained. If continued heavy grazing pressure (short stubble) is allowed, persistence will decrease, plants will die, and the sward will be opened up to invasion by broadleaf weeds and common bermudagrass. Therefore, stubble height (6 to 10 inches) is one of the most important factors affecting stargrass persistence. Since plant height above the stubble has a major effect on forage yield and quality, plants should be grazed when plant height ranges between 6 and 18 inches above the stubble. If there is a feed shortage, Florona stargrass, unlike Florico or Ona stargrasses, can be grazed to a 4-inch stubble without major harm to the plant stand.

PLANTING MATERIAL DISTRIBUTION

Information regarding planting material of Florona stargrass can be obtained from the following offices:

Florida Foundation Seed Producers, Inc.
P. O. Box 309
Greenwood, Florida 33443

Agricultural Research and Education Center
3401 Experiment Station
Ona, Florida 33865

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