South Florida Herbicide Application

Brent A. Sellers[a] and Jason A. Ferrell[b]
[a]Assistant Professor, Range Cattle Research & Education Center, UF/IFAS, Ona, FL
[b]Assistant Professor, Agronomy Depatment, UF/IFAS, Gainesville, FL

This presentation will focus on several weed species important to the pasture production in Florida. General information, biology, and control will be discussed for tropical soda apple, dogfennel, smutgrass, blackberry briars, thistle, cogongrass, spiny amaranth, and wild radish.

Tropical Soda Apple (TSA)

Our studies have shown that millions (30-50 million) of seed can be produced per acre from pastures with low to high TSA infestations. Seed germination is generally around 75%, but not all of the seed germinates in the first 30 days of testing. Therefore, a small percentage (10-20%) of seed is dormant. Based on field observations and comments from ranchers, we now believe that these dormant seed will survive two to five years in the soil, especially during extended dry climatic periods. This information means that ranchers must remove TSA plants before they produce fruit (seed) to avoid a soil seed bank that will germinate over a two- to five-year period.

1. Current Control Recommendations

In the past, we relied upon mowing followed by an application of Remedy at 2 pint/acre to flowering TSA in May to June. Thanks to new chemistry, mowing is no longer necessary and these products have soil residual activity for at least six months after application applied at any time during the year.

Milestone (aminopyralid) is a new herbicide produced by Dow AgroSciences that is labeled for pasture and rangeland. Aminopyralid is effective at very low rates (5-7 ounces/acre). An additional herbicide, called Forefront, has also been labeled, which contains aminopyralid + 2,4-D to increase the weed control spectrum. An application rate of 2.6 pints/acre is equivalent to the Milestone rate of 7 ounces/acre.

Tests with Milestone were performed in the spring, summer, and fall seasons to stands of mature TSA to evaluate control of standing plants along with emerging seedlings. In all trials, other herbicides were applied including Remedy, 2,4-D, Weedmaster, and PastureGard. To summarize results, Milestone applications resulted in the highest control of existing plants (95-100%) up to one year after application along with control of TSA seedlings (six months after treatment).

Here are some summary comments about this new herbicide:

1. Controls old plants (no mowing).
2. Soil activity should provide approximately six months of TSA seedling control.
3. Cheaper cost compared to Remedy.
4. Will be the herbicide of choice for controlling TSA.

Mowing is not required prior to spraying Milestone and this herbicide can be applied throughout the year when the plants are actively growing. In South Florida, the best time to spray will probably be in the late fall (November - December) to control mature plants and to suppress new TSA seedlings. This approach should provide excellent TSA control throughout the winter-spring seasons when forage production is most needed. Eliminating mowing reduces the cost of control and provides more available forage for grazing.

For more information see EDIS publication: Tropical Soda Apple (*Solanum viarum* Dunal) in Florida (http://edis.ifas.ufl.edu/WG201).

Dogfennel

Dogfennel is a weed of many areas, but is most frequently a problem in pastures, where it lowers forage quantity and quality. Many herbicides are available for

dogfennel control in addition to mowing. Mowing has been shown to decrease the amount of biomass produced the following year. However, with rising fuel and labor costs, a herbicide application may be more economical. WeedMaster, perhaps the most economical herbicide available, provides good to excellent dogfennel control if applied when the plant is less than 30 inches tall. Controlling dogfennel early in the growing season will result in increased forage production. Once dogfennel is greater than 30 inches, other herbicides should be considered. Pasturegard at 3 pints/acre is the most effective herbicide for larger dogfennel plants.

In 2005, we initiated an experiment to test several herbicides on dogfennel control in relation to height. Herbicides listed in Table 1 were applied to 15-, 30-, and 60-inch dogfennel. This trial was conducted near the Range Cattle REC in Ona. The first application was applied in early June, the second in July, and the third in September just prior to flowering. All herbicides provided >95% control (Table 1) when applied to 15 inch dogfennel. WeedMaster at 3 quarts/acre, Pasturegard at ≥ 2.5 pints/acre, and Remedy at 2 pints/acre provided ≥ 95% control of 30-inch dogfennel. Pasturegard was the only herbicide that provided ≥ 90% control of 60-inch dogfennel.

For more information see EDIS publication: Dogfennel biology and control (http://edis.ifas.ufl.edu/AG233).

Smutgrass

1. Control

Smutgrass can be controlled with 0.75 to1.0 lb active ingredient/acre (3-4 pints/acre of Velpar 2L or 1.00 -1.33 pounds/acre of Velpar 75 DF) of Velpar during the rainy season as it is important that the herbicide reaches the root zone for uptake into the plant. Use the higher rate to control giant smutgrass and the lower rate to control small smutgrass. In most cases, one can expect at least 90% control within the first year following Velpar application. Mowing and burning is not a recommended practice while using Velpar as mowing spreads smutgrass seed and burning has been suggested to increase seed germination. Burning, however, will allow for approximately two weeks of grazing, because cattle will graze young smutgrass.

2. Economics of Smutgrass Control

How does one decide to control smutgrass? In general, it has been our recommendation to control smutgrass in pastures when infestation is greater than 80%. One should also consider the cost of infestation as well (Table 2). However, a universal decision rule on whether to control smutgrass cannot be suggested. For example, the cost of infestation will increase with higher calf prices, animal performance levels, and pasture productivity. However, if calf prices are low, it would not be cost-effective to control giant smutgrass even at high densities (>70%). Table 2 highlights the economics of smutgrass control in a bahiagrass pasture.

Using the assumptions in Table 2, notice that an application of Velpar to pasture infested with a low density of smutgrass would result in a net loss of income. However, controlling smutgrass at medium and high densities would result in a net return of at least $29 per stocking unit. Therefore, it is important to plug your own numbers into this type of analysis.

Not all forages are as tolerant as bahiagrass to Velpar applications. In fact, bahiagrass shows visual injury for approximately 20 to 40 days after application. Although visual injury is not apparent 40 days after application, bahiagrass biomass production may be at least 25% less during the first year following Velpar application. Other forage grasses show different levels of tolerance.

For specific recommendations consult the publication SS-AGR-18, entitled *Smutgrass Control in Perennial Grass Pastures*. Also, remember to follow all label directions and stay at least 100 feet away from oak trees as Velpar is lethal to oaks.

3. Will the addition of an adjuvant to Velpar help?

Most of the activity from Velpar is from root uptake. However, there is also some foliar activity.

Recently, some producers have suggested that an adjuvant called Optima provided very good smutgrass kill when added to the spray tank with Velpar. Studies were conducted and it was determined that the addition of an adjuvant did not increase smutgrass control when Velpar was applied at 1.0 pounds/acre (Figure 1). This implies that the addition of Optima to Velpar does not increase control when rainfall follows Velpar application within the same day.

For more information see EDIS publication: Smutgrass control in perennial grass pastures (http://edis.ifas.ufl.edu/AA261).

Briars

Control of briars is important as they can shade important forage grasses and harm reproductive organs of bulls. Our current recommendations for briar control consist of Remedy at 2 pints/acre or Cimarron at 0.4 ounces/acre. Cimmaron should not be applied to grass pastures consisting of Pensacola bahiagrass as severe forage injury may occur. It is important to point out that briars are usually most sensitive when flowering, and canes should not be mowed within one year of herbicide application.

For more information see EDIS publication: Blackberry and dewberry: biology and control (http://edis.ifas.ufl.edu/AG238).

Cogongrass

Currently, the best management practice for cogongrass is to burn or mow the existing vegetation to remove excess thatch and older leaves and initiate regrowth from the rhizomes. This allows for two things: 1) Decreases rhizome reserves and biomass, and 2) herbicides will be applied only to actively growing leaf tissue. If burning, this should occur during the summer as burning during the dry season can be a severe fire hazard (cogongrass burns at very high temperatures). If tillage can be performed, deep plowing or disking (at least 6 inches) helps to deplete rhizome reserves and promotes desiccation of the rhizomes and increases the number of shoots per given area. For either approach alone, or for burning followed by tillage, a one to four month regrowth period has been shown to produce sufficient leaf biomass for an herbicide treatment. Herbicides available for cogongrass control include glyphosate at 3 to 4 quarts/acre (Roundup, etc.) and Arsenal at 1 pound active ingredients/acre (1 quart Arsenal AC or 2 qt Arsenal). Arsenal, however, can only be applied to 1/10 of the pasture, and it can provide up to six months to a year of vegetation-free soil. Therefore, glyphosate appears to be the best option for pastures as revegetation is necessary to prevent cogongrass from reinfesting a given area.

For more information see EDIS publication: Cogongrass Biology, Ecology and Management in Florida (http://edis.ifas.ufl.edu/WG202).

Thistle

There are several different species of thistle in Florida (at least seven species), most are closely related and the control recommendations will not differ. While scouting, you may encounter tall thistle, Leconte's thistle, swamp thistle, Nuttall's thistle, purple or yellow thistle, bull thistle, Virginia thistle, and possibly others. Although thistles can create problems for grazing, both mowing and chemical control can be effective control measures if conducted at the proper time.

Mechanical control. Preventing seed production is of utmost importance when attempting to manage thistle populations. Little can be done to effectively manage these plants if allowed to flower and produce seed before control occurs. While not very practical, rosettes can be manually removed by hand when small by cutting the plant below the soil surface to prevent regrowth. This is time consuming and only effective on very small infestations. Mowing thistles can be an effective strategy, but timing is critical. Clipping thistles later in the spring (April to June) is quite effective when the flower stalk is typically hollow (late bolting stage). The plant is not likely to regrow or produce seed if mowed at this time. However, mowing when plants are in the rosette stage (prior to flower stalk formation – bolting) is not effective and regrowth will occur. Therefore, mow only after rosettes have bolted, but before flowers are formed. Not to discourage mowing, but timing a mowing treatment can be difficult since thistles do not bloom at the same time. Finally, rising

fuel costs may make mowing a non-economical thistle control method, especially when it may require multiple mowing treatments for optimum control.

Chemical control. Herbicides are often the most flexible and affordable option for thistle control in pastures. However, like mowing, timing is an important factor for many herbicides. Several commonly used pasture herbicides are highly effective on thistles, if applied early in the growing season (Table 3). Thistles in the rosette state are highly sensitive to herbicides and are easily controlled. However, delaying the application until after bolting can have a dramatic impact on effectiveness, particularly with 2,4-D and Cimarron. When applied at flowering, all herbicides provide less than 90% control, except for Milestone. In this case, using a herbicide may or may not be warranted, as they can provide short-term control but will not be effective in long-term management. Yes, Milestone will control flowering thistle, but if seeds are already produced and the plant is beginning to die, mowing may be the best, temporary, option.

The importance of application timing cannot be over-stated. Thistles are normally not visually evident as a problem until flowers are produced. However, the plants are there in the rosette form long before flowers emerge, and early scouting should allow early detection and optimum control. Quickly scouting the pastures in late winter (January to March) will reveal the presence of thistles (rosette stage) and allow for an inexpensive herbicide application. If you wait until thistles flower, mowing and/or herbicide options are limited, less effective, and more expensive. Take the time to scout early, because it is the key to better and economical thistle control.

Spiny Amaranth

A member of the pigweed or *Amaranthus* family, spiny amaranth can be found throughout Florida. Pigweed species are capable of producing hundreds of thousands of seeds per plant. Research in the Midwest revealed that a single spiny amaranth is capable of producing approximately 114,000 seeds. Germination of pigweed species generally occurs under conditions of high temperature, soil moisture, and light quality. You will likely see spiny amaranth germination and establishment occur in disturbed areas where light reaches the soil surface

Control of spiny amaranth can be a sticky situation. As pigweeds get larger, control becomes more difficult. Therefore, more herbicide may be required for adequate control. Herbicides that have activity on spiny amaranth include Pasturegard, Cimarron, Cimmaron Max, Milestone, Forefront, and Banvel. Aim is also another herbicide that has good activity on spiny amaranth, but the plants must not be taller than 3 inches for complete control. The addition of Aim to WeedMaster has been shown to increase control. Be sure to read the label for specific rates and adjuvant selection. It is best to apply these herbicides when plants are small and actively growing. Except when applied after flowering, any of these herbicides should reduce the number of seeds produced by the plant.

Wild Radish

Wild radish is one of the most common and problematic pasture weeds in the Florida Panhandle. Wild radish has traditionally been classified as a winter annual. Generally, these species germinate during the fall months when soil temperatures drop below 65° F. Studies indicate a chilling requirement is necessary to break dormancy. In addition, wild radish has a thick fruit pod from which the seed does not shatter free easily. Therefore, the pod must decay before the seed can be released to germinate.

After emergence, wild radish forms a rosette of leaves throughout the winter and early spring. The wild radish plant remains in rosette form through most of the winter, reaching approximately 10 to 14 inches across at the base. In late winter to early spring, as the temperature and day length increase, the plant bolts. Bolting is a process in which the internodes (regions of the stem between leaves) begin to lengthen and a flower stalk forms at the top. In wild radish, multiple flower heads form on several branches arising from a single flower stalk. The flowers are generally yellow but occasionally may be white.

Mechanical control. Mechanical control of wild

radish is a consideration, but rarely is it effective. Mowing will generally not harm the basal leaves and allow regrowth to occur within a short period of time. Additionally, a single wild radish plant will often produce many flushes of flowers and set several seed crops. Regular mowing cycles will reduce seed production, but will not eliminate seed production entirely. Frequent mowing will also reduce the productivity and forage yield of the pasture. Therefore, mowing to control wild radish is often more expensive and less effective than other options.

Chemical control. One of the most common and cost effective methods of controlling wild radish is through the use of herbicides. Some of the most effective and inexpensive herbicides for wild radish control are growth regulators such as 2,4-D and dicamba (Banvel, Clarity, etc.). These herbicides provide excellent control of wild radish when properly applied. The growth regulating herbicides are generally considered safe on grasses.

The timing of an herbicide application is critical for effective wild radish control (Figure 2). Research has shown that >90% wild radish control can be consistently achieved when 2,4-D is applied to plants less than 6 inches in height. By delaying the application until the plant reaches 12 inches, control drops to approximately 70%. However, if wild radish begins to flower before 2,4-D is applied, less than 50% control should be expected. Therefore, herbicides should be applied early to achieve the greatest wild radish control while avoiding herbicide injury to winter forage.

For more information see EDIS publication: Wild radish: biology and control (http://edis.ifas.ufl.edu/WG215).

Table 1. Dogfennel response to herbicides 90 days after treatment.

		Dogfennel size at application		
	Rate	15 inch	30 inch	60 inch
Herbicide	(pint/acre)		% control	
PastureGard	2	96	79	90
PastureGard	2.5	100	95	90
PastureGard	3	100	98	93
PastureGard	4	100	99	93
WeedMaster	2	98	88	64
Remedy	2	99	95	88
WeedMaster	3	100	97	85
WeedMaster + Remedy	1 + 1	100	84	84
Outlaw	1.75	95	48	54
Outlaw	2.75	97	66	75
Outlaw + Remedy	1.5 + 1	100	86	76
LSD (0.05)	-		3	

Table 2. Economic analysis of smutgrass control in bahiagrass pastures.

Smutgrass density	Bahiagrass lb/acre	Bahiagrass stand %	Stocking rate Factor	Calf production	Calf value	Cost of smutgrass infestation	Cost of smutgrass control	Net return from smutgrass control
				$/stock unit				
None	2,409	100	1.00	385	331	0.00	0.00	--
Low <20%	1,930	80	0.80	308	265	66.00	81.00	-15.00
Medium >20% <70%	1,606	67	0.67	258	221	110.00	81.00	29.00
High >70%	1,414	59	0.59	227	195	136.00	81.00	55.00

Assumptions: Stocking unit (3 acres), wean percentage (70%), wean weight (550 lb), wean calf price ($86/cwt), Velpar application ($27/acre); pasture continuously grazed, mature giant smutgrass is not grazed.

Table 3. Control of thistle at three growth-stages with common pasture herbicides.

			Thistle growth stage		
			Rosette[b]	Bolting[c]	Flowering
Herbicide	Rate	$/A[a]	% Control		
2,4-D	2 qt/A	6	90	85	40
Cimarron[d]	0.3 oz/A	7	90	40	40
Weedmaster	2 pt/A	6	95	90	55
Remedy	2 pt/A	21	95	90	75
Pasturegard	3 pt/A	18	95	90	70
Milestone	4 oz/A	11	99	95	90

[a]Approximate herbicide prices.
[b]The rosette stage is when the thistle forms a low-growing ring of leaves.
[c]The bolting stage is when the thistle forms a stalk and prepares to flower.
[d]For use in bermudagrass only.

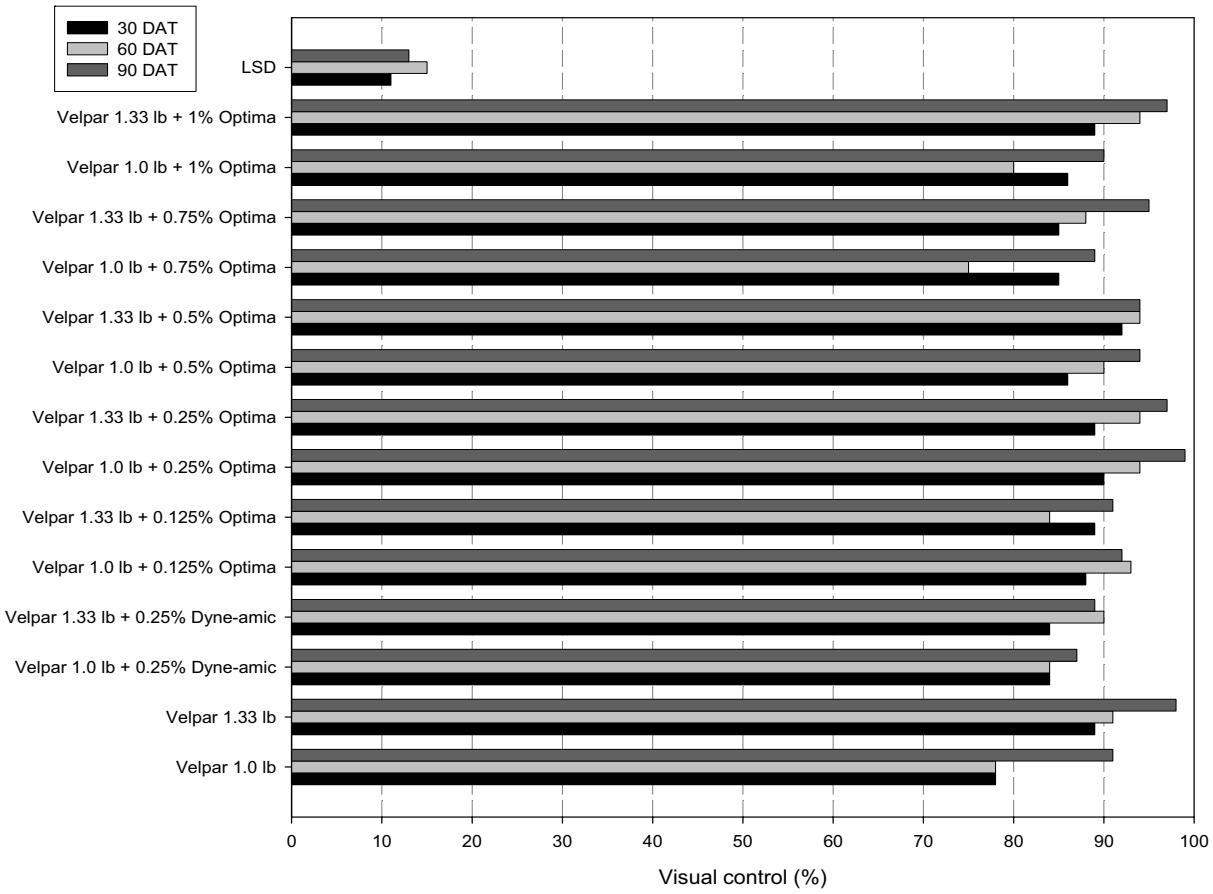

Figure 1. Response to giant smutgrass to Velpar with and without Optima adjuvant. Abbreviation: DAT = days after treatment. Treatments were applied in June, 2005. Rainfall occurred the same evening after application.

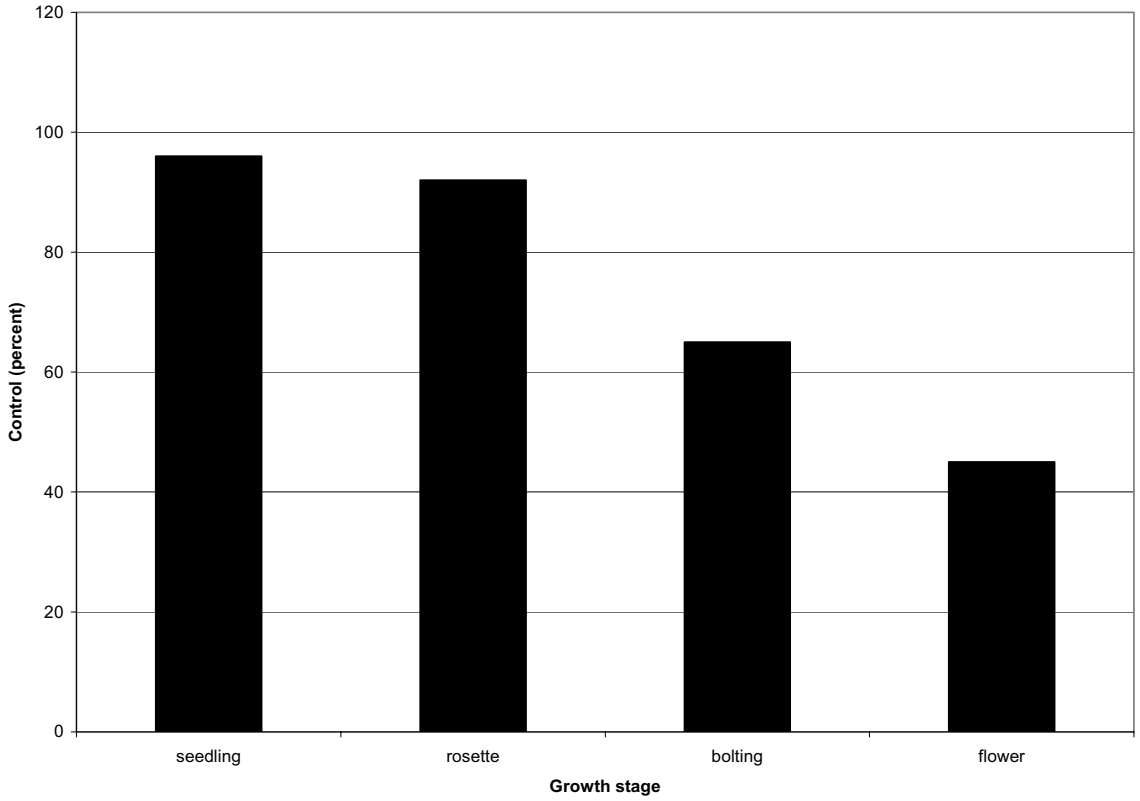

Figure 2. Response to wild radish to 2, 4-D at different growth stages.

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