

Chapter 13.

Okra Production in Florida

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BOTANY

Nomenclature

Family - Malvaceae

Okra - *Abelmoschus esculentus*

Origin

Okra is native to northeastern Africa in the general area of Ethiopia and the Sudan.

Related Species

Okra is the only vegetable crop of significance in the Malvaceae family (Fig. 13-1). Cotton is the most important economic crop in this family, but there are many widely used ornamental plants.

VARIETIES

Varieties of okra grown in Florida (H=hybrid):

Annie Oakley II (H)	Spike (H)
Cajun Delight (H)	Clemson Spineless
Clemson Spineless 80	North and South (H)

SEEDING AND PLANTING

Seeding and planting information for okra production in Florida is given in Table 1.

FERTILIZER AND LIME

For unmulched crops with subsurface or sprinkler irrigation, broadcast all P₂O₅, micronutrients, and 25 to 50% of the N and K₂O before planting. Increased fertilizer efficiency might result from broadcasting in the bed area only or by banding at planting. Remaining N and K₂O should be banded in one or two applications during early plant growth. Soil test and fertilizer recommendations for okra grown on mineral soils are given in Table 2.

For mulched crops with subsurface irrigation, broadcast all P₂O₅, micronutrients, and 20 to 25% N and K₂O in bed. Apply remaining N and K₂O in a band in a groove 2 to 3

inches deep in bed center of twin-row crops. With sprinkler irrigation, incorporate all fertilizer in bed area. Leached N and K₂O can be replaced by liquid fertilizer injection wheel. For drip-irrigated crops apply all P₂O₅, micronutrients, and up to 20 to 25% of N and K₂O in bed. Inject remaining N and K₂O through tube according to the schedule given in Table 3.

PLANT TISSUE ANALYSIS

Plant tissue analysis for okra is listed in Table 4. Testing was done during the early flowering period on the most recently matured leaf.

IRRIGATION

Okra water requirements (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Tables 4-6) are highest during rapid growth and development (100% of ETo) decreasing to 90% of ETo (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Table 3) during the final growth period. Root systems may be extensive on some typical deep sandy soils, thus allowing less frequent irrigation applications.

Table 1. Seeding and planting information for okra in Florida.

Planting dates	
North Florida	Mar - Jun
Central Florida	Feb - Aug
South Florida	Jan - Mar Aug - Oct
Seeding information	
Distance between rows (in)	36 - 60
Distance between plants (in)	4 - 10
Seeding depth (in)	0.5 - 1.0
Seed per acre (lb)	6 - 8 ¹
Days to first harvest from seed	60 - 70
Plant population ² (acre)	43,560
¹ Assuming 80% germination.	
² Population based on closest between and within row spacing.	

WEED MANAGEMENT

Herbicide labeled for weed control in okra are listed in Table 5.

INSECT MANAGEMENT

Table 7 outlines the insecticides approved for use on insects attacking okra.

DISEASE MANAGEMENT

The chemicals approved for disease management in okra are listed in Table 6.

Table 2. Soil test and fertilizer recommendations for okra grown on 6-foot bed in twin-rows on mineral soils.¹

Target pH	N lb/A	P_2O_5					K_2O				
		VL	L	M	H	VH	VL	L	M	H	VH
		(lb/A/crop season)									
6.5	120	150	120	100	0	0	150	120	100	0	0

¹ See Chapter 2 section on supplemental fertilizer application and best management practices, pg 11.

Table 3. Fertilization recommendations for okra grown in Florida on sandy soils testing very low in Mehlich-1 potassium (K₂O)

Production system	Nutrient	Recommended-Base fertilization ^z				Recommended-Supplemental fertilization ^z				
		Total (lbs/A)	Preplant ^y (lbs/A)	Injected ^x (lbs/A/day) Weeks after transplanting ^w				Leaching rain ^{r,s}	Measured "low" plant nutrient content ^{u,r}	Extended harvest season ^{u,s}
				1-2	3-4	5-12	13			
Drip irrigation, raised beds, and polyethylene mulch (on deep sands or on soils with shallow Impermeable layer)	N	120	0-40	1.0	1.5	2.0	1.5	n/a	1.5 to 2 lbs/A/day for 7 days ^t	1.5 to 2 lbs/A/day ^p
	K ₂ O	150	0-50	1.0	1.5	2.0	1.5	n/a	1.5 to 2 lbs/A/day for 7 days ^t	1.5 to 2 lbs/A/day ^p
Seepage irrigation, raised beds, and polyethylene mulch (on soils with shallow impermeable layer)	N	120	120 ^v	0	0	0	0	30 lbs/A ^q	30 lbs/A ^t	30 lbs/A ^p
	K ₂ O	150	150 ^v	0	0	0	0	20 lbs/A ^q	20 lbs/A ^t	20 lbs/A ^p

^z A=7,260 linear bed feet per acre (6-ft bed spacing); for soils testing "very low" in Mehlich 1 potassium (K₂O) Seeds and transplants may benefit from applications of a starter solution at a rate no greater than 10 to 15 lbs/acre for N and P₂O₅, and applied through the plant hole or near the seeds.

^y Applied using the modified broadcast method (fertilizer is broadcast where the beds will be formed only, and not over the entire field). Preplant fertilizer cannot be applied to double/triple crops because of the plastic mulch; hence, in these cases, all the fertilizer has to be injected.

^x This fertigation schedule is applicable when no N and K₂O are applied preplant. Reduce schedule proportionally to the amount of N and K₂O applied preplant. Fertilizer injections may be done daily or weekly. Inject fertilizer at the end of the irrigation event and allow enough time for proper flushing afterwards.

^w For standard 13 week-long, transplanted okra crop.

^v Some of the fertilizer may be applied with a fertilizer wheel though the plastic mulch during the okra crop when only part of the recommended base rate is applied preplant. Rate may be reduced when a controlled-release fertilizer source is used.

^u Plant nutritional status may be determined with tissue analysis or fresh petiole-sap testing, or any other calibrated method. The "low" diagnosis needs to be based on UF/IFAS interpretative thresholds.

^t Plant nutritional status must be diagnosed every week to repeat supplemental fertilizer application.

^s Supplemental fertilizer applications are allowed when irrigation is scheduled following a recommended method (see Chapter 3 on irrigation scheduling in Florida). Supplemental fertilizations is to be applied in addition to base fertilization when appropriate. Supplemental fertilization is not to be applied "in advance" with the preplant fertilizer.

^r A leaching rain is defined as a rainfall amount of 3 inches in 3 days or 4 inches in 7 days.

^q Supplemental amount for each leaching rain

^p Plant nutritional status must be diagnosed after each harvest before repeating supplemental fertilizer application.

Table 4. Plant tissue analysis at early flowering for okra. Dry wt. basis.

Status	N	P	K	Ca	Mg	S	Fe	Mn	Zn	B	Cu
	Percent						Parts per million				
Deficient	<3.5	0.3	2.0	0.5	0.25	0.3	50	30	30	25	5
Adequate range	3.5-5.0	0.3-0.6	2.0-3.0	0.5-0.8	0.25-0.50	0.3-0.8	50-100	30-100	30-50	25-50	5-10
High	>5.0	0.6	3.0	0.8	0.50	0.8	100	100	50	50	10

Table 5. Chemical weed controls: okra.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre)	
			Mineral	Muck
Carfentrazone (Aim)	Okra	Preplant Directed-hooded Row-middles	0.031	0.031
Remarks: Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burn-down of emerged broadleaf weeds. May be tank mixed with other registered herbicides. may be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant at recommended rates.				
Glyphosate (Roundup) Touchdown, Durango Glyphomax	Okra	Prior to crop emergence or pretransplanting	0.5 - 1.0	0.5 - 1.0
Remarks: Apply as directed for "Cropping Systems" under conditions described on label. Does not provide residual weed control.				
Pelargonic Acid (Scythe)	Okra	Preplant Preemergence Directed-Shielded	3-10% v/v	3-10% v/v
Remarks: Product is a contact, non-selective, foliar applied herbicide. There is no residual activity. May be tank mixed with glyphosate. May be tank mixed with trifluralin for soil residual activity. Consult label for rates and other information.				
Trifluralin (Several brands)	Okra	Preplant incorporated	0.5 - 0.75	---
Remarks: Controls germinating annuals, especially grasses. Incorporate 4 inches or less within 8 hours. Results in Florida are erratic on soils with low organic matter and clay contents. Note precautions of planting non-registered crops within 5 months.				

Table 6. Disease management for okra.

Chemical	Fungicide Group	Max. Rate Per Acre Per		Min. Days to Harvest	Pertinent Diseases	Remarks
		Application	Season			
Amistar	11	5 oz	1.0 lb	0	Powdery mildew	Limit is 4 appl./crop & alternate chemistry
Apron XL LS	4	0.64 fl oz/100 lbs seed			Pythium damping-off	Seed treatment
Armicarb 100 Fungicide (potassium bicarbonate)		5 lb		0	Anthracnose, Pod spot, Leaf spot, Powdery mildew	Do not apply through any irrigation systems; Avoid tank mixing with highly acidic pesticides; Do not spray seed directly
Defiant (thiram)	M3	4.0 oz /100 lb seed			Damping off, Seed decay, Seedling blight	Seed protection
Heritage	11	8.0 oz	2 lb	0	Powdery mildew, Anthracnose	See label
Kocide 3000	M1	1.75 lb		0	Anthracnose, Bacterial leaf spot, Leaf spots, Pot spot, Powdery mildew	See label
Kocide 2000	M1	3 lb		0	Anthracnose, Bacterial leaf spot, Leaf spots, Pot spot, Powdery mildew	See label
Milstop (potassium bicarbonate)		3 lb		0	Alternaria leaf spot, Anthracnose, Cercospora leaf spot, Powdery mildew	Do not apply through any irrigation systems
Alude (potassium phosphite)		2 qt			Damping-off, Root rot	See label
Fosphite (potassium phosphite)		3 qt			<i>Phytophthora</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Rhizoctonia</i> spp.	See label
Fungi-phite (potassium phosphite)		2-4 qt (see label)			<i>Phytophthora</i> and <i>Pythium</i> spp. Bacterial and leaf diseases, Anthracnose, Leaf spots, Powdery mildew	See label
Topaz (potassium phosphite)		Varied, See label			<i>Phytophthora</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Rhizoctonia</i> spp. Powdery mildew	See label
Quadris	11	15.5 fl oz	1.0 lb a.i.	0	Powdery mildew, Anthracnose, Seedling rot (<i>Rhizoctonia</i>)	See label
Rally 40 WSP	3	5 oz	20 oz	0	Powdery mildew	Do not make more than 4 applications per season

Table 6. Continued.

Chemical	Fungicide Group	Max. Rate Per Acre Per		Min. Days to Harvest	Pertinent Diseases	Remarks
		Application	Season			
Serenade ASO (<i>Bacillus subtilis</i> strain QST713)		6 pt		0	Powdery mildew	See label
Serenade MAX (<i>Bacillus subtilis</i> strain QST713)		3 lb		0	Powdery mildew	See label
Microthiol-Disperss (sulfur)	M2	10 lb			Leaf spot, Powdery mildew	See label
Sulfur 90W (sulfur)	M2	20 lb			Powdery mildew	Apply in greenhouses
Trilogy (neem oil)		1.0% or 2 pt			Alternaria, Anthracnose, Leaf spot, Powdery mildew	See label

Table 7. Selected insecticides approved for use on insects attacking okra.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Acramite-50WS (bifenazate)	0.75-1.0 lb	12	3	twospotted spider mite	un	One application per season.
Admire Pro (imidacloprid)	7-14 fl oz	12	21	aphids, flea beetles, leafhoppers, foliage feeding thrips, whiteflies	4A	No more than 32 oz per acre.
Admire Pro (imidacloprid)	0.44 fl oz/10,000 plants	12	21	aphids, whiteflies	4A	Planthouse - 1 application to transplants. See label.
*Asana XL (0.66 EC) (esfenvalerate)	5.8-9.6 fl oz	12	1	cabbage looper, corn earworm, southern armyworm	3	Florida only.
Avaunt (indoxacarb)	2.5-3.5 oz	12	3	beet armyworm, hornworms, loopers, southern armyworm, tomato fruitworm	22	Maximum = 14 oz/acre per crop
Aza-Direct (azadirachtin)	1-2 pts, up to 3.5 pts, if needed	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	un	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
Azatin XL (azadirachtin)	5-21 fl oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	un	Antifeedant, repellent, insect growth regulator.
BotaniGard 22 WP, ES (<i>Beauveria bassiana</i>)	WP: 0.5-2.0 lb/100 gal ES: 0.5-2 qt/100 gal	4	0	aphids, thrips, whiteflies	--	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Not compatible in tank mix with fungicides.
Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	caterpillars	11	Use high rate for armyworms. Treat when larvae are young.
Deliver (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-1.5 lb	4	0	caterpillars	11	Use higher rates for armyworms. OMRI-listed ² .
Entrust (spinosad)	0.5-2.5 oz	4	1	armyworms, flower thrips, leafminers, loopers, other caterpillars, <i>Thrips palmi</i> , tomato fruitworm	5	Do not apply more than 9 oz per acre per crop. OMRI-listed ² .
Esteem Ant Bait (pyriproxyfen)	1.5-2.0 lb	12	1	red imported fire ant	7C	Apply when ants are actively foraging.
Extinguish ((S)-methoprene)	1.0-1.5 lb	4	0	fire ants	7A	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
Intrepid 2F (methoxyfenozide)	4-16 fl oz	4	1	beet armyworm, cabbage looper, fall armyworm, hornworms, southern armyworm, tomato fruitworm, true armyworm, yellowstriped armyworm	18	Do not apply more than 64 fl oz per acre per season.

Table 7. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.50 lb	4	1	most caterpillars, but not <i>Spodoptera</i> species (army- worms)	11	Treat when larvae are young. Thorough coverage is essential OMRI-listed ² .
JMS Stylet-Oil (oil, insecticidal)	3-6 qts/100 gal	4	0	leafminers, mites, whiteflies	--	See label for tank mix cautions. Organic Stylet-Oil is OMRI- listed ² .
Knack IGR (pyriproxyfen)	8-10 fl oz	12	14	whiteflies (immatures)	7C	Do not make more than 2 appli- cations per season.
Lepinox WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	1.0-2.0 lb	12	0	for most caterpillars, including beet armyworm (see label)	11	Treat when larvae are small. Thorough coverage is essential.
Malathion 8F (malathion)	1.5 pt	12	1	aphids	1B	
Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, leafhop- pers, leafminers, loopers, whiteflies	un	IGR and feeding repellent. OMRI-listed ² .
Provado 1.6F (imidacloprid)	3.8 oz	12	0	aphids, leafhoppers, whiteflies	4A	Do not apply more than 19 oz per acre per year.
Pyrellin EC (pyrethrin + rotenone)	1-2 pt	12	12 hours	aphids, leafhoppers, leafmin- ers, loopers, lygus bugs, plant bugs, mites, thrips, whiteflies	3, 21	
Radiant (spinetoram)	5-10 fl oz	4	1	armyworms, dipterous leaf- miners, hornworms, loopers, thrips, tomato fruitworm	5	Control of leafminers and thrips may be improved with an adju- vant.
Sevin XLR, 4F, 80S (carbaryl)	XLR, 4E: 1-1.5 qt 80S: 1.25-1.88 lb	12	3	corn earworm, stink bugs	1A	Do not apply more than a total of 6 qt or 7.5 lb per acre per season.
SpinTor (spinosad)	1.5-8.0 fl oz	4	1	armyworms, flower thrips, hornworms, leafminers, <i>Liriomyza</i> spp., <i>Thrips palmi</i> , tomato fruitworm	5	For resistance management, do not use more than 3 times in any 21-day period, then rotate to a different class of products or no insecticide for 21 days.
Synapse (flubendiamide)	2-3 oz	12	1	armyworms, hornworms, loopers, tomato fruitworm	28	Do not apply more than 9 oz/ acre per season.
*Telone C-35 (dichlo- ropropene + chloropi- crin)	See label	5 days - See label	preplant	symphylans, wireworms	--	See supplemental label for use restrictions in south and central Florida.
*Telone II (dichloropropene)	See label					
Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	18B	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .

Table 7. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code ¹	Notes
The pesticide information presented in this table was current with federal and state regulations at the time of revision. The user is responsible for determining the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label instructions.						
<p>¹ Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 6.1 August 2008.</p> <ul style="list-style-type: none"> 1A. Acetylcholinesterase inhibitors, Carbamates (nerve action) 1B. Acetylcholinesterase inhibitors, Organophosphates (nerve action) 2A. GABA-gated chloride channel antagonists (nerve action) 3. Sodium channel modulators (nerve action) 4A. Nicotinic acetylcholine receptor agonists (nerve action) 5. Nicotinic acetylcholine receptor allosteric activators (nerve action) 6. Chloride channel activators (nerve and muscle action) 7A. Juvenile hormone mimics (growth regulation) 7C. Juvenile hormone mimics (growth regulation) 9B and 9C. Selective homopteran feeding blockers 10. Mite growth inhibitors (growth regulation) 11. Microbial disruptors of insect midgut membranes 12B. Inhibitors of mitochondrial ATP synthase (energy metabolism) 15. Inhibitors of chitin biosynthesis, type 0, lepidopteran (growth regulation) 16. Inhibitors of chitin biosynthesis, type 1, homopteran (growth regulation) 17. Molting disruptor, dipteran (growth regulation) 18. Ecdysone receptor agonists (growth regulation) 22. Voltage-dependent sodium channel blockers (nerve action) 23. Inhibitors of acetyl Co-A carboxylase (lipid synthesis, growth regulation) 28. Ryanodine receptor modulators (nerve and muscle action) un. Compounds of unknown or uncertain mode of action <p>² OMRI listed: Listed by the Organic Materials Review Institute for use in organic production.</p> <p>* Restricted Use Only.</p>						