



Herbaceous Weed Control Recommendations for Planted Slash Pine Sites

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INTRODUCTION

Herbaceous weed control (HWC) during the early spring following planting slash pine seedlings can be critical to growth and survival on old-field, pasture, hayfield, and cut-over sites, particularly in droughty years. Herbaceous weeds include grasses, sedges, and broadleaf plants that compete with planted pines for soil moisture, nutrients, and growing space. Many studies have shown that limiting the competitive influences of these weeds, particularly in the first year after planting, improves planting survival and accelerated stand growth leads to early harvest. In most cases a 4-6 ft wide banded herbicide application centered overtop of seedlings can be just as effective as overtop broadcast HWC applications, except where grass sod or abundant vines are present. Do not make HWC applications where seedlings are stressed (e.g. drought, winter injury, insects, etc.), they do not have a sufficient root system (at least five lateral roots originating from the taproot), or have not begun active root growth after planting (typically one to two months for slash pine).

The purpose of this paper is to provide readers with the most up-to-date application information and product availability on herbicides that are labeled for slash pine HWC. Always read the herbicide label prior to purchase to verify that the herbicide is labeled for the intended use.

HERBICIDES FOR CONTROL OF BROADLEAF WEEDS AND GRASSES

*****These treatments are applied overtop of pines unless noted otherwise*****

Recommended timings in this paper are for north Florida and the Georgia Coastal Plain latitudes (30.0 – 32.5 degrees N) – latitudes north of the Georgia Coastal Plain should add one or more weeks to the timings suggested in this paper. After planting, pay close attention to local weather conditions during late winter and early spring in your area as the onset of spring often varies from year to year. Plan HWC applications according to weather conditions in a given year. The optimal stage of weed growth for HWC application is generally as an early post emergence timing (as the site “greens up” in the spring to when weeds are ankle high), but Arsenal, Velpar, and Transline are also effective on established weeds (post-emergent application timing). The “grass herbicides” Envoy, Fusilade, and Segment II are effective only on emerged grasses. April and May have historically been the two driest months during the first half of the year in Georgia and most herbicides should be applied BEFORE newly planted pine seedlings are under drought stress.

ARSENAL® Applicators Concentrate (often abbreviated Arsenal® AC) (BASF; active ingredient 53% imazapyr salt, 4 lb acid equivalent imazapyr per gallon (ae) with no surfactant in the product formulation)

- Herbicide is very effective on perennial grasses, including difficult to control species such as seedling Johnsongrass and panicum species.
- Product offers weak control of broadleaf weeds in the composite group and legumes such as coffeeweed, sicklepod, and lespedeza species (see Oust® XP and Transline® labels).
- Arsenal (R) is effective on established weeds.
- Apply 4 – 6 fluid oz product per acre.
- Do not add surfactant.
- **Imazapyr may cause severe slash pine stunting at excessive rates, ensure proper sprayer calibration to apply precise herbicide rate per acre.**
- Optimum application timing: pre-emergence to post emergence of weeds (March to mid-April most years)
- Provides grass and broadleaf weed control including, but not limited to: bahiagrass, barnyardgrass, bluegrass (annual, Kentucky), Bermudagrass, crabgrass, fescue, foxtail, Italian ryegrass, Johnsongrass, lovegrass, panicums, sandbur, wild oats, witchgrass, camphorweed, carpetweed, chickweed, clovers, cocklebur, dandelion, dogfennel, horseweed, goldenrod, knotweed, lambsquarters, milkweed, ragweed (common, giant), pepperweed, pigweed, plantain, pokeweed, purslane, pusley (Florida), shepard's purse, sowthistle, stinging nettle, annual spurge, sunflower, tansymustard, wild carrot, wild parsnip, and wild turnip

OUST® XP (Bayer; active ingredient 75% sulfometuron methyl by weight)

- Herbicide is very effective on a broad spectrum of broadleaf weeds, including composites
- Product offers weak control of perennial grasses including Bermudagrass, some panicum species, and broomsedge species. As noted above, a common broad-spectrum tank mix is 4 oz Arsenal® AC plus 2 oz Oust® XP per acre.
- For first-year plantings: Apply 2-4.25 oz Oust product per acre
- Optimum application timing: As an early pre-emergence spray (March-April)
- Do not use Oust® XP when soil pH > 6.2 or seedling damage is likely.
- Provides grass and broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutsedge (yellow), broadleaf Panicum, pokeweed, ragweed, shepherd's purse, white snakeroot, yellow sweetclover, annual bluegrass, barnyardgrass, foxtail barley, foxtail fescue, Italian ryegrass, jointed goatgrass, bromes (red, ripgut), reed canarygrass, signalgrass, yellow foxtail, mustard, pepperweed, pigweed, sunflower, vetch, wild carrot, and wild oats.

OUST® XP (Bayer; 75% sulfometuron methyl by weight) + **VELPAR® L VU** (Bayer; active ingredient 25% hexazinone by weight) or **OUST® XP+ VELPAR® DF VU** (Bayer; 75% hexazinone by weight)

- Broad spectrum weed control of broadleaf weeds and most grasses, but is weak on Bermudagrass, broomsedge, and some panicum species.
- Hexazinone may cause pine seedling mortality on sandy sites and on sites with low soil organic matter (i.e. old-fields). Ensure proper calibration and follow label directions regarding appropriate rates for various soil textures. Conduct a soil test(s) prior to spraying if unsure of site soil conditions.
- Apply 2-3 oz Oust® XP product + VELPAR® L VU at 1.5 - 3 pints (or Velpar® DF VU at 8 – 16 oz product) per acre depending on soil texture (see product label).
- Optimum application timing: pre- to early post-emergence of weeds (March - mid April)
- Do not use Oust® XP when soil pH > 6.2.
- Use low rate of Oust® XP + Velpar® L VU or Velpar® DF VU on coarse textured (sand, loamy sand, and sandy loam) soils and where soils are low in organic matter (see label).
- Provides grass & broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutsedge (yellow), broadleaf Panicum, pokeweed, ragweed, shepherd's purse, white snakeroot, yellow sweetclover. annual bluegrass, barnyardgrass, foxtail barley, foxtail fescue, Italian ryegrass, jointed goatgrass, bromes (red, ripgut), reed canarygrass, signalgrass, yellow foxtail, mustard, pepperweed, pigweed, sunflower, vetch, wild carrot, wild oats, asters, brackenfern, and fleabane.

OUSTAR® (Bayer; active ingredient 11.8% sulfometuron methyl and 63.2% hexazinone by weight) – Product has not been produced by Bayer since 2018-19, but some vendors may still have supplies.

- Similar to the tank mix using Oust® XP and Velpar® L or DF VU products as above, but in a packaged mixture.
- The ratio of active ingredients is set; the hexazinone rate tends to be too high on sandy sites and low soil organic matter sites.
- For first-year weed control application product rates per acre:
 - 10-12 oz Coarse-textured soils (sand, loamy sand, sandy loam)
 - 12-16 oz Medium-textured soils (loam, sandy clay loam, silt loam)
 - 16-19 oz Fine-textured soils (clay loam, sandy clay, silty clay loam, silty clay)
- After first-year weed control application product rates per acre:
 - 12-16 oz Course textured soils
 - 16-19 oz Medium textured soils
 - 18-24 oz Fine textured soils
- Do not use Oustar when soil pH > 6.2.
- Optimum application timing is pre- to early post-emergence (March – mid-April).
- Provides grass and broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutsedge (yellow), broadleaf Panicum, pokeweed, ragweed, shepherd's purse, white snakeroot, and yellow sweetclover

ATRAZINE 90 DF (Drexel®; active ingredient 88.4% atrazine by weight)

- Provides control of annual broadleaf or grass weeds such as annual ragweed, barnyardgrass, black nightshade, cocklebur, downy brome, fall panicum, field pennycress, giant foxtail, lambsquarters, maretail, pigweed, and prickly lettuce after transplanting or in established conifers including slash pine
- Apply 2.2-4.4 lbs in a minimum of 10 gallons of water per acre.
- Apply before weeds reach 1.5” tall.
- Rainfall is required to activate this product.
- Restricted-use herbicide

OUST® EXTRA (Bayer; active ingredient 56.25% sulfometuron methyl and 15% metsulfuron methyl by weight)

- Apply 2 2/3 to 3 oz Oust® Extra product per acre.
- Application timing: Pre- to early post emergence (March to mid-April)
- Note: Escort® XP + Oust® XP for plants controlled.

ESCORT® XP (Bayer; active ingredient 60% metsulfuron methyl by weight)

- Apply 1/3 - 2 oz Escort® XP product per acre.
- Application timing: Pre- to early post-emergence (March to mid-April)
- Provides good to excellent blackberry control as well as broadleaf weeds and grasses including: annual sowthistle, aster, bahiagrass, beebalm, bittercress, bitter sneezeweed, blackeyed-susan, blue mustard, bull thistle, buttercup, chicory, cocklebur, common chickweed, common groundsel, common purslane, common yarrow, common sunflower, conical catchfly, corn cockle, crown vetch, curly dock, dandelion, dewberry, dogfennel, false chamomile, fiddleneck tarweed, field pennycress, garlic mustard, goldenrod, henbit, honeysuckle, multiflora rose and other wild roses, lambsquarters, lettuce (miners, wild), maretail/horseweed*, maximilian sunflower, mustard (transy-, treacle, wild), oxeye daisy, Pennsylvania smartweed, plantain, pigweed (redstem, smooth), plumeless thistle, prostate knotweed, redstem filaree, sericea lespedeza, sheperd’s purse, silky crazyweed (locoweed), falseflax, sweet clover, tansy ragwort, teasel, wild carrot, wild garlic, woolly croton, wood sorrel, and yankeeweed.

* Certain biotypes of maretail/horseweed are less sensitive to Escort® XP.

OUST® EXTRA + ARSENAL® AC

- Apply 2 oz Oust® Extra + 4 oz Arsenal® product per acre.
- Application timing: Pre- to post-emergence
- Imazapyr may cause severe slash pine stunting at excessive rates, ensure proper sprayer calibration to apply precise herbicide rate per acre.
- Refer to list of plants controlled for Escort® XP and Arsenal® AC.

ESCORT® XP + VELPAR L® VU or VELPAR® DF VU

- Apply 1/2 - 1.0 oz Escort® XP product + Velpar® L or Velpar® DF product (see label for specific Velpar® rates) per acre.
- Application timing: Early post to post-emergence
- Blackberry control, broadleaf weeds and grasses (refer to Escort® and Velpar® for lists of plants controlled)

VELPAR® DF VU (Bayer; active ingredient 75% hexazinone by weight)

- **May cause mortality where excessive rates are applied on sandy soils in droughty conditions, ensure proper sprayer calibration to apply precise herbicide rate per acre, following label recommendations regarding specific herbicide rates for various soil types.**
- First year weed control application product rates per acre (the same amounts can be applied in years 2, 3, and 4):
 - 1 1/3 lb Course textured soils (loamy sand, sandy loam)
 - 1 1/3 – 1 1/2 lb Medium textured soils (loam, sandy clay loam, silt, silt loam)
 - 1 1/2 - 1 4/5 lb Fine textured soils (sandy clay, silty clay loam, silty clay, clay, clay loam)
- Weed control application product rates per acre for established trees (≥ 4-yrs-old):
 - 1 1/3 – 1 2/3 lb Coarse-textured soils
 - 1 2/3 – 2 1/3 lb Medium-textured soils
 - 2 1/3 – 2 2/3 lb Fine-textured soils
- Optimum timing: Pre- to early post-emergence (March – early May)
- Grass & broadleaf control including, but not limited to: Asters, barnyardgrass, annual bluegrass, brackenfern, bromegrass, fleabane, foxtail, horseweed, ragweed, ryegrass, blackberry (dewberry)

VELPAR® L VU (Bayer; active ingredient 25% Hexazinone by weight)

- May cause mortality where excessive rates are applied on sandy soils in droughty conditions, ensure proper sprayer calibration to apply precise herbicide rate per acre, following label recommendations regarding specific herbicide rates for various soil types.
- First year weed control application product rates per acre (the same amounts can be applied in years 2, 3, and 4):
 - 21 to 32 oz Course textured soils (loamy sand, sandy loam)
 - 24 to 40 oz Medium textured soils (loam, sandy clay loam, silt, silt loam)
 - 28 to 48 oz Fine textured soils (clay, clay loam, sandy clay, silty clay loam, silty clay)
- After fourth year weed control application product rates per acre:
 - 21 to 40 oz Coarse-textured soils
 - 28 to 56 oz Medium-textured soils
 - 36 to 64 oz Fine-textured soils
- Optimum timing: Pre- to early post-emergence (March – mid-April)
- Provides grass & broadleaf control including, but not limited to: Asters, barnyardgrass, annual bluegrass, brackenfern, bromegrass, fleabane, foxtail, horseweed, ragweed, ryegrass, blackberry (dewberry)

TRANSLINE® (Corteva Agriscience; active ingredient 40.9% clopyralid)

- Release treatments may be made any time during the growing season. Some needle/leaf curling may occur if applied during active tree growth.
- Treatments may be made broadcast over trees of any age.
- Broadcast applications can be applied using 11 to 21 fl. oz. per acre of Transline®.
- Controls clover, coffeeweed, cocklebur, hairy indigo, kudzu, marestail/horsweed, morning glory, partridge pea, ragweed, sicklepod, vetch, wisteria
- Can provide control of leguminous weeds with applications throughout the growing season.
- Do not apply if weeds are in drought stress.
- Product NOT labeled in Florida

ESPLANADE® F (Bayer; active ingredient indaziflam 19.05%, contains 1.67 lb per gallon)

- A selective, preemergent herbicide for control of broadleaf weeds and grasses in conifer (including slash pine) production areas.
- Apply 3.5-7 oz product per acre as an overtop or broadcast application.
- Herbicide will not control germinated weeds; apply soon after planting.
- Herbicide is rain activated and performs best if it contacts mineral soil.
- Do not use surfactant.
- Controls or suppresses bittercress, carpetweed, chickweed, corn speedwell cudweed, clover, dandelion, eclipta, evening primrose, filaree, fleabane, Florida pusley, gromwell, groundsel (common), fleabane, horseweed, lambsquarters, lawn burweed, little mallow, long-stalk phyllanthus (Mascarene Island leaf flower), panicle willowweed, plantain spp., prostrate pigweed, prostrate spurge, purslane, ragweed, shepherd's purse, sowthistle, swinecress, velvetleaf, wild buckwheat (seedlings), wild mustard, yellow starthistle, annual brome grass, barnyardgrass, crabgrass, cheatgrass, downy brome, foxtail spp., goosegrass, lovegrass, sprangletop, ryegrass, annual sedge, and tufted lovegrass

Please read and follow all label recommendations. Inclusion of a product trade name or a company name in this publication does not constitute an endorsement of a product or a company, as other products manufactured by different companies might be equally suited for the intended herbicide use.

HERBICIDES FOR CONTROL OF ANNUAL & PERENNIAL GRASSES ONLY

- All grass control herbicides listed below are postemergence, foliar active herbicides.
- Best control for all grass species is obtained when grasses are in an early growth stage. For Texas panicum, apply when the grass is less than 4 inches tall. For Bermudagrass two applications are usually needed; the first when less than 6 inches of new green growth and a second when re-growth is less than 4 inches. Multiple applications are also needed for Johnsongrass.
- Herbicides in this group generally do not mix well with other herbicide products. However, it is very important to add surfactants (wetting agents) to improve plant uptake. See information below and product labels for details.
- Herbicide spray solution (water) volumes are typically between 10 to 20 gallons per sprayed acre (GPA) up to 40 GPA; read label for specifics.
- Do not apply herbicides when pine seedlings and desirable grasses are under drought or other stress.
- Do not apply herbicides when rainfall is expected within one hour.

ENVOY® PLUS (Valent; active ingredient 12.6% clethodim, 0.97 lb clethodim per gallon, contains petroleum distillates)

- Apply 9 to 16 fluid oz per acre for annual grasses, 12 to 32 oz/acre for perennial grasses.
- Add crop oil concentrate which contains at least 15% emulsifier at 1% volume/volume (1 qt per 25 gallons spray solution, but no less than 1 pint per acre) or nonionic surfactant at 0.25% volume/volume (1 qt per 100 gallons).
- Apply in 10 to 40 gallons of water per acre.
- Do not apply more than 64 oz/ac per season, make a minimum 14-day interval between applications, do not apply more than 32 oz/ac per application.

FUSILADE® DX (Syngenta; active ingredient 24.5% fluazifop-P-butyl, 2 lb per gallon fluazifop-P-butyl)

- Apply 16-24 fluid oz product per acre per application.
- Use a lower dose for annual grasses, and a higher dose for perennial grasses.
- Add 1% crop oil concentrate (1 quart per 25 gal) or 0.25% nonionic surfactant (1- quart per 100 gal).
- Do not apply more than 72 fluid oz Fusilade® DX per acre, per season.
- **Avoid contact of spray with foliage and terminal bud by using directed sprays. Do not apply overtop applications of Fusilade® DX.**

ARROW® 2EC (Makhteshim Agan of North America (MANA); active ingredient 26.4% clethodim, 2.0 lbs clethodim per gallon, contains petroleum distillates)

- Apply 6 to 8 fluid oz product per acre for annual grasses and 8 to 16 oz/acre for perennial grasses.
- Add crop oil concentrate which contains at least 15% emulsifier at 1% volume/volume (1 qt per 25 gallons spray solution, but no less than 1 pint per acre) or nonionic surfactant at 0.25% volume/volume (1 qt per 100 gallons).

SEGMENT® II (BASF; active ingredient 18.0% sethoxydim, 1.5 lb sethoxydim per gallon, contains petroleum distillates)

- Apply 1.5 pints per acre for annual and perennial grasses up to 6 inches tall.
- Apply in 20 gallons of water per acre.
- Use crop oil concentrate at 2.0 pints per acre or methylated seed oil at no less than 1.5 pints per acre.
- Apply during spring after 4 to 6 inches of new growth but prior to seedhead formation. Apply before conifer bud-break or conifer injury is possible.
- Repeat applications may be necessary. Poor grass control may occur if grass is stressed

Table 1: WEED TOLERANCE TO SELECTED HERBICIDES

Herbicide	Weeds tolerant to the herbicide listed
ARSENAL	sicklepod, tropic croton, blackberry, most legumes
AATREX	Bermudagrass, lespedeza, Johnsongrass, broomsedge, blackberry
ARROW 2EC, ENVOY PLUS, SELECT II	All broadleaf weeds
ESPLANADE F	Bermudagrass, tropic croton, broomsedge, Johnsongrass, lespedeza, blackberry
FUSILADE DX	All broadleaf weeds
OUST XP	Bermudagrass, croton, Johnsongrass, trumpetcreeper, broomsedge
PENDULUM 2G	Bermudagrass, morningglory spp., croton, broomsedge, blackberry, most legumes
VELPAR L VU, VELPAR DF VU	Bermudagrass, broomsedge, cocklebur, Johnsongrass, sicklepod, trumpetcreeper, morningglory spp.

Table 2: GRASS WEED RESPONSE TO HERBICIDES

WEED	Post Emergence Chemical		
	FUSILADE	SEGMENT II	ENVOY
Perennial Grasses			
Bermudagrass	G - E	F - G	G - E
bahiagrass	G	F	
Johnsongrass (rhizome)	E	G	E
tall fescue	F	G	
nutsedge	P	P	P
Annual Grasses			
broadleaf signalgrass	E	E	E
crowfootgrass	F	G	G
crabgrass	F	G - E	G
fall panicum	G	G	G
foxtail		E	
goosegrass	F - G	F - G	F - G
Johnsongrass (seedling)	G - E	G - E	E
sandbur	G	G	G - E
Texas panicum	G - E	E	E
Italian ryegrass		E	

E=Excellent (>90% control); G=Good (80-89% control); F=Fair (70-79% control); P=Poor (<70%). Citations: Guillebeau, P. (ed). 2005 & 2008. Georgia Pest Mgmt. Handbook. Special Bulletin 28. UGA Coop. Ext. Service. Athens, GA 30602. pp. 112, 156-57, 198-99. aFluazifop-P-butyl rating based on Fusilade DX trials, bClethodim ratings based on Select® and Arrow® trials, Sethoxydim (Segment II) ratings based on Poast trials.

Also consider:

- (1) The herbicide purchaser and applicator need to look closely at the herbicide label to make sure that the herbicide product used is: (a) labeled for the particular use site (e.g. “for use in forest sites”, “for use in conifer plantations”, etc.) (b) labeled for the pine crop species (or genus in some cases), and (c) labeled for the desired application (“herbaceous weed control in pine plantations”, “herbaceous release”, etc.). Herbicide products, even those with the same trade name (such as “Forestry Garlon XRT®” which is not used for over-top HWC treatments), may have different concentrations or formulations of the active ingredient per gallon, so always follow rates specified on the label of the particular container being used.
- (2) Remember rates are per acre treated. Here are two examples of calculating the quantity of herbicide needed for a banded herbicide application using 2 oz Oust® XP + 1.5 pints of Velpar® L VU products per acre treated, assuming 12 feet between the rows: (a) spraying a 4-foot-wide band, 2 oz Oust® XP + 1.5 pints Velpar® L VU per acre will treat three acres total land area. In effect, one acre is banded and two acres are untreated, so herbicide is applied to one-third of the area. A total of 66.67 oz (4.17 lbs) of Oust® XP and 33.33 pints (4.17 gallons) Velpar® L VU would be needed for a 100-acre field where one-third of the area is treated in 4-foot bands. (b) When spraying a 6-foot-wide band on rows 12 feet apart, 2 oz Oust® XP and 24 oz Velpar® L VU per acre will treat two acres total land area. One acre is banded and one acre is untreated, so herbicide is applied to half the area. A total of 100 oz (6.25 lbs) of Oust® XP and 75 pints (9.38 gallons) Velpar® L VU would be needed for a 100-acre field where herbicide is applied to one-half the area in bands.
- (3) There are generics for some of the above listed herbicides and various product labels for the same active ingredient do vary. Read the product labels to make sure that your intended use is consistent with labeling.

Please read and follow all label recommendations. Inclusion of a product trade name or a company name in this publication does not constitute an endorsement of a product or a company, as other products manufactured by different companies might be equally suited for the intended herbicide use.

Table 3: Old-field, non-scalped, not bedded or V-blade planted post-plant herbaceous weed control timing considerations for the Georgia Coastal Plain and central to northern Florida.

*For scalped sites, herbicides applied from mid-April into mid- to late May have given good survival and growth results based on previous studies as long as seedlings are not under stress (especially drought stress).

Soil Drainage Class	Pre- to Early Post Emergence Herbicide Application Timing	Early Post to Post Emergence Herbicide Application Timing
Somewhat Excessively to Excessively Well-Drained	March	March to early April
Moderately Well to Well-Drained	March to early April	Mid-March to mid-April
Poorly to Somewhat Poorly Drained	April to early May	Mid-April to mid-May

*For scalped, bedded or V-blade planted sites, herbicides applied from mid-April into mid- to late May have given good survival and growth results based on previous studies as long as seedlings are not under stress and wait at least 1 1/2 months after planting slash seedlings before the overtop herbicide application. (especially drought stress).

Table 4: Organization of GA (FL, AL and SC in some cases) Coastal Plain Soil Series in Management Groups (Larry Morris “Forest soils and management decisions” workshop 2005)

Subsoil Type:		None (Sandy to loamy sand)	Loamy	Clayey	Spodic	
Drainage	Surface Depth (inches)				+Arg	-Arg.
Very poorly		Rutledge	Torhunta Surrency	Bayboro		Murville Wesconnet
Poorly to Somewhat Poorly	0-10	Chiple Osier Scranton	Rains Lynchburg	Bladen Coxville Grady	Rigdon	Ridgeland
	10-20		Pelham	Nanhunta	Mascotte Sapelo	Leon Mandarin
	20-40		Albany Plummer	Kanapaha		Hurricane Pottsburg
	40-80					
Moderately Well to Well Drained	0-10	Resota Pactolus Ortega	Goldsboro Tifton Dothan	Faceville Nankin Greenville	Onslow	
	10-20				Seagate	Baymeade
	20-40		Lucy Fuquay Stilson			Echaw
	40-80		Bomifay			
Somewhat to Excess. Well	40-80	Lakeland Kershaw	Troup			Rimini Kureb

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