

Land Management Chemicals - Descriptions and Usage

Information prepared by the Athens-Clarke County Sustainability Office, fall 2018

Information Sources: The information below was a compilation of data from a range of federal and state agencies, cooperative extension service publications and information provided by the chemical companies (see files); This information is provided as a service and ACCGOV makes no claims or validation as to the accuracy of the data as provided by these groups and agencies

Chemicals used for ACCGOV land management

Active Ingredient	Trade Names*	Formulations Available for Aquatic Use?	Recommended Surfactant	Use in Forest Management	Target	Resistant	Time of Year	Persistence in the Environment (Soil Activity, Half-life, Mobility Potential)	Possible Carcinogen?	Personal Protective equipment PPE from Label	Notes	Folder Link
2,4-D ester	2,4 D Ester 700, 2,4 D Ester 6, Barrage, Aqua-Kleen, Weedone	No	Non-ionic surfactant; may be mixed with a nitrogen fertilizer or crop oil concentrate	Hardwood site prep; cut/spray; conifer release	Broad leaf plants	Grasses	During periods of active growth and warm weather; Apply when weeds are small and actively growing before bud stage; Application during drought conditions yield poor results	Average soil half-life: 10 days; Microbial metabolism; Soil Active Mode of Action: Auxin mimic; Volatility: Highly volatile (should not be applied in windy conditions or high temperatures) Mobility: At pH levels < 4, microbial degradation is inhibited. Soil Adsorption increases with increasing soil organic content and decreasing soil pH.	No; classified by the EPA as "not likely to be carcinogenic to humans"	Protective eye wear, Long-sleeved shirt, long pants, socks and closed-toed shoes, chemical resistant gloves	Weeds that have been treated with 2,4-D in natural areas include: Canada thistle (<i>Cirsium arvense</i>), <i>Cardaria</i> spp., crown vetch (<i>Cornilla varia</i>), Russian knapweed (<i>Acroptilon repens</i>), water hyacinth (<i>Eichhornia crassipes</i>), and sulfur cinquefoil (<i>Potentilla recta</i>).	2,4-D Ester
2,4-D Amine (salt)	DMA 4 IVM, Amine 4 2,4-D Weed Killer, Sculptin G, Renovate Max G	Yes	Non-ionic surfactant; may be mixed with a nitrogen fertilizer or crop oil concentrate	cut/spray, conifer release	Broad leaf plants	Grasses	anytime during growing season	Average soil half-life: 10 days; Microbial metabolism; Soil Active Mode of Action: Auxin mimic; Volatility: Highly volatile (should not be applied in windy conditions or high temperatures) Mobility: At pH levels < 4, microbial degradation is inhibited. Soil Adsorption increases with increasing soil organic content and decreasing soil pH. Salt-formulations are water-soluble and do not bind strongly with soils which means there is potential for the chemical to	No; classified by the EPA as "not likely to be carcinogenic to humans"	waterproof material, closed-toed shoes and socks		2,4-D Amine
2-4DB Standard	Butoxone, Butyrac, Embutone, Embutox	No	Non-ionic surfactant; may be mixed with a nitrogen fertilizer or crop oil concentrate	cut/spray, conifer release	Broad leaf plants: redroot, field bindweed, shepherd's purse, buttercups (annual), cresses, fathen, hedge mustard, nettles, platains, thistles, wild turnip, ragwort, willow weed, wireweed	Grasses	weeds are seedlings	In soil, the compound is broken down by the action of soil microbes to the product 2,4-D. The half-life for the parent compound (2,4-DB) is 7 days; Soil Active Broken down to 2,4-D. Little information about 2,4-DB in the environment. No specific data available for 2,4-DB's persistence in surfacewater or groundwater.	No; classified by the EPA as "not likely to be carcinogenic to humans"	Long-sleeved shirt, long pants, chemical-resistant gloves made of any waterproof material, closed-toed shoes and socks		2,4DB Standard
2-4DB-DMAS (amine salt)	Drexel	No	Non-ionic surfactant	cut/spray, conifer release	Broad leaf plants; common ragweed, Russian thistle, sicklepod, smart weed, wild mustard, yellow rocket	Grasses	anytime during growing season	Average soil half-life: 10 days; Microbial metabolism; Soil Active Rapidly dissociates in moist soils and aquatic environments to 2,4-DB. Not expected to bioaccumulate in the environment.	No; classified by the EPA as "not likely to be carcinogenic to humans"	Protective eyewear, long-sleeved shirt, long pants, close-toed shoes, socks, chemical-resistant gloves		2,4DB-DMAS
Aminopyralid	Milestone, Capstone, Opensight	Yes	Non-ionic surfactant	early conifer release; cut/spray anytime but spring (use mix called Capstone)	most hardwoods, broadleaf herbaceous plants (ex: dog fennel, pigweed, greenbriar, morning glory, rhus, morning glory, horseweed, pigweed, sicklepod, ragweed)	grasses	grow season, preferred when weeds are small and actively growing; directed/spot spray application only	Average soil life of 34.5 days; aerobic microbial metabolism; Soil Active and Foliar Active Mode of Action: Auxin mimic	No; classified by the EPA as "not likely to be carcinogenic to humans"	Long-sleeved shirt, long pants, closed-toed shoes, socks		Aminopyralid
Clethodim	Arrest Max, Grass Out Max, Agistar Clethodim 2E Post-emergent Herbicide	No	Non-ionic surfactant	hardwood site prep	Grasses (young grasses best)	legumes, some ryegrasses are developing resistance	anytime during the growing season.	Under Aerobic soil metabolism, average half life of 3 days; All measurable residues confined to top 20 cm of soil; Foliar application with minimal root uptake Mobility: Weakly binds to the soil which makes it mobile, however it has a very short half-life which makes this of little concern. Highly persistent in aquatic environment with a half life of 128 days	No	Protective eye wear, Long-sleeved shirt, long pants, socks and closed-toed shoes, chemical resistant gloves, respirator in some cases		Clethodim
Clopyralid	Clean Slate, Transline, Reclaim, Curtail	No	Non-ionic surfactant	conifer and hardwood site prep; early conifer and hardwood release; cut/spray	many broadleaf weeds such as sicklepod, morning glory, ragweed, coffeeweed, thistle, wisteria, and kudzu; woody legumes, annual and perennial broadleaf weeds, particularly of the Asteraceae (sunflower family), Fabaceae (legume family), Solanaceae (nightshade family), Polygonaceae (knotweed family), and Violaceae (violet family)]	Grasses and most hardwood species; little effect on grasses and other monocots but also does little harm to members of the mustard family (Brassicaceae) and several other groups of broad-leaf plants	Anytime during the growing season. Mid to late summer. Preferred when weeds are small and actively growing. Broadcast foliar application made over the top of tolerant tree species or directed wet spot applications	Average soil half-life: 40 days - takes up to a year to not be detectable in soils; Microbial metabolism; does not bind with soil; Soil Active and Foliar Active (though foliar application may be more effective) Mode of Action: Auxin mimic Mobility: inability to bind with soils combined with persistence makes it a contamination threat to water resources and non-target plants; Class 5 (Very mobile) herbicide; Extremely water soluble; Aquatic half life of 8-40 days Rapidly dissociates to anion form once in environment Volatility: Low volatility	No	Long-sleeved shirt, long pants, chemical-resistant gloves made of any waterproof material, closed-toed shoes and socks, protective eyewear	On TNC preserves, clopyralid has been used against Canada thistle (<i>Cirsium arvense</i>), honey mesquite (<i>Prosopis glandulosa</i>), Russian knapweed (<i>Acroptilon repens</i>), yellow starthistle (<i>Centaurea solstitialis</i>), Chinese privet (<i>Ligustrum sinense</i>), bird's-foot trefoil (<i>Lotus corniculatus</i>), English ivy (<i>Hedera helix</i>), and Chinese wisteria (<i>Wisteria sinensis</i>); Highly selective herbicide developed as an alternative to picloram	Clopyralid
Dicamba	Vanquish	No	Non-ionic surfactant	Conifer site prep; cut/spray anytime but spring	Many annual and perennial broadleaf weeds, woody brush (including hardwoods and pines), multiflora rose (when dormant) Any season, except during heavy sap flow in spring. Injection or hatchet frill girdle and spray bottle.	sweetgum, maple, oak	During periods of active growth	Average soil half-life: 7 to 42 days; microbial metabolism; Soil Active and Foliar Active Mobility: Weakly binds to soil making it mobile. High soluble in water. Volatility: Low volatility	Not likely	Long-sleeved shirt, long pants, closed-toed shoes, chemical-resistant gloves		Dicamba
Glyphosate	Accord XRTIL, Foresters, Razor, Razor Pro, Roundup Pro Concentrate, Rodeo, Refuge, AquaMaster, Roundup Ultra®, Honcho®, Rascal®, Ranger Pro®, Landmaster H®	Yes	For RoundUp Original: Adjuvants already added; Non-ionic surfactant or ammonium sulfate may also be added For RoundUp Ultra: Adjuvants already added; ammonium sulfate may also be added For Rodeo, AquaMaster, Glypro: Non-ionic surfactant Note: Only AquaMaster, Glypro, Rodeo formulations can be applied on water	Hardwood and Conifer site prep; early conifer release; early hardwood release (winter spray only); cut/spray anytime but spring	Most hardwoods (black locust, persimmon, sassafras, sumac, sweetgum, yellow-poplar) most annual and perennial grasses and forbs bush honeysuckle (<i>Lonicera maackii</i>), cogon grass (<i>Imperata cylindrica</i>), common buckthorn (<i>Rhamnus cathartica</i>), glossy buckthorn (<i>Frangula alnus</i>), Japanese honeysuckle (<i>Lonicera japonica</i>), and smooth brome (<i>Bromus inermis</i>)	smooth pigweed, palmer amaranth, spiny amaranth, tall waterhemp, common ragweed, giant ragweed, hairy fleabane, horseweed, Kochia, Italian ryegrass, ragweed parthenium, annual bluegrass, Russian-thistle, Johnsongrass	Prior to planting, active growth following full leaf expansion	Average soil half-life: 47 days; Microbial metabolism; Little information available. Some formulations are high toxic to aquatic organisms; Foliar application Mobility: Binds strongly to soil which prevents it from excessive leaching or from being taken up from the soil by non-target plants. In water, rapidly dissipates through adsorption to suspended and bottom sediments with half life of 12 days to 10 weeks;	No; "Group E" carcinogen (has not shown evidence of carcinogenicity in humans)	Long-sleeved shirt, long pants, closed-toed shoes		Glyphosate
Hexazinone	Velpar DF (dispersible granules), Velosa, Velpar L (liquid), Pronone	No	Do not use surfactant over top of conifers or seedlings	conifer site prep; early conifer release; cut/spray anytime; early hardwood prep (yellow poplar only)	Most hardwoods, rhus, crabgrass, fescue, lespedeza, horseweed, dog fennel, annual and perennial eye grass; tansy-mustard (<i>Descurainia pinnata</i>), cheatgrass (<i>Bromus tectorum</i>), flares (<i>Erodium spp.</i>), shepherds-purse, (<i>Capsella bursa-pastoris</i>), false dandelion (<i>Hypochaeris radicata</i>), privet (<i>Ligustrum spp.</i>), and Chinese tallowtree (<i>Sapium sebiferum</i>)	Yellow-poplar, eastern reedcedar, sassafras, blackgum, hollies, American bearberry, Bermudagrass, white snakeroot, broomsedge, Johnsongrass, sicklepod, trumpet vine, morning glory	Early spring - early summer after bud break and before hardening off Larger wood species are best controlled by injection or hack-and-squirt technique For herbaceous species, apply in most soil conditions as foliage spray or basal soil treatment (Foliar application)	Average soil half-life: 90 days - Microbial metabolism; does not bind with soil; potentially persistent in aquatic systems; harms algae but low toxicity to fish and aquatic invertebrates; Best absorbed through root system (Soil Active); Soil Active and Foliar Active Mobility: Weakly binds with soil which makes the chemical mobile which poses a groundwater and non-target species threat. Water soluble.	No; "Group D" carcinogen (not classifiable as human carcinogen)	Long-sleeved shirt, long pants, closed-toed shoes, protective eye wear	Potential for groundwater contamination	Hexazinone
Imazapyr	Arsenal AC, Polaris AC, Chopper, Polaris SP, Habitat, Imazapyr E Pro 2 VM & Aquatic herbicide, Stalker	Yes	Methylated seed oil or crop oil concentrate; Non-ionic surfactant; Silicone-based surfactant; Fertilizer-surfactant blends	Conifer site prep and release; cut/spray in summer	Most hardwoods, annual and perennial grasses and forbs, Bermuda, fescue, crabgrass, dog fennel, pigweed, greenbriar, morning glory, saltcedar (<i>Tamarix ramosissima</i>), privet (<i>Ligustrum vulgare</i>), blackberries (<i>Rubus spp.</i>), field bindweed (<i>Convolvulus arvensis</i>), bahiagrass (<i>Paspalum notatum</i>), and downy brome (<i>Bromus tectorum</i>)	Elms, woody legumes, wax myrtle, croton spp., rhus, buckeye, baccharis, pine	For Early Conifer Prep: Arsenal AC and Polaris AC: Summer, in advance of regeneration Chopper and Polaris SP: Growing season following full leaf expansion For Conifer Release: Arsenal AC and Polaris AC: Late in second growing season	Average soil half-life: 25-141 days; Microbial metabolism; Soil Active and Foliar Active (Foliar preferred) Mobility: Environmental pH determines the persistence and mobility. Below a pH of 5, the adsorption to soil increases and limits its movement in soil. Above a pH of 5, adsorption capacity decreases and mobility potential increases. Half life	No	Long-sleeved shirt, long pants, closed-toed shoes, socks, chemical resistant gloves	Provides long-term total vegetation control	Imazapyr
Metsulfuron Methyl	Escort XP, Patriot, Manor	No	Non-ionic surfactant	Conifer site prep; early conifer release; cut/spray anytime but spring; early hardwood preparation and suppression	Annual and perennial broadleaf herbaceous plants, woody plants, kudzu, multiflora rose	Most grasses, yellow poplar	Grow season; Can be applied either post emergent or preemergent; periods of active growth following full leaf expansion	Average soil half-life: 30 days; Soil Active and Foliar Application are effective Mobility: High solubility and poor soil adsorption, potential for movement and groundwater contamination	Not likely	Chemical-resistant, waterproof gloves, long-sleeved shirt, long pants, closed-toed shoes, sock		Metsulfuron Methyl
Sethoxydim	Poast, Torpedo, Ultima, Vantage, Conclude, Rezult	No	For Vantage: Adjuvants already added, no surfactants needed For Poast: Methylated seed oil or crop oil concentrate	Conifer site prep	Annual and perennial grasses; bahiagrass (<i>Paspalum notatum</i>), crabgrass (<i>Digitaria sanguinalis</i>), downy brome (<i>Bromus tectorum</i>), quackgrass (<i>Elytrigia repens</i>), annual ryegrass (<i>Lolium multiflorum</i>), wild oats (<i>Avena spp.</i>), and witchgrasses, (<i>Panicum spp.</i>)	Annual bluegrass, annual or perennial sedges, broadleaf weeds	Best time - when plant is flowering but before seed is mature (generally in August - early September)	Average soil half-life: 5 days; Microbial metabolism and photolysis degradation mechanism; Foliar application Mobility: High mobility. Water soluble and does not bind strongly with soils	No	Chemical-resistant gloves, chemical-resistant shoes, socks, chemical-resistant headgear, protective eyewear, coveralls over shorts and shirt	Rapid degradation can limit effectiveness	Sethoxydim
Sulfometuron Methyl	Oust XP, Spyder	No	Non-ionic surfactant	Hardwood and Conifer site prep; early conifer release; early hardwood release (late winter/early spring before bud swell); cut/spray anytime but spring	Annual grasses, forbs, and some perennial herbs	Bermuda, broomsedge, croton spp., panicums	Early spring before herbaceous plants emerge or shortly after; fall prior to planting	Average soil half-life: 14-42 days; Microbial metabolism; Soil active Mobility: Limited mobility in soils, low contamination	No	Long-sleeved shirt, long pants, closed-toed shoes, socks		Sulfometuron Methyl
Triclopyr, amine	Element 3A, Garlon 3A, Tahoe 3A	No	Non-ionic surfactant	Conifer site prep; cut/spray anytime but spring	Most hardwoods, southern pine, waxy species such as bay, gallberry, wax myrtle, and yaupon, forbs, dog fennel, pigweed, greenbriar, and morning glory, rhus	Grasses	During periods of active growth	Average soil half-life: 30 days; Microbial metabolism; photolysis degradation mechanism in a few hours in water; Mainly Foliar active, limited soil active	No; "Group D" carcinogen (not classifiable as human carcinogen)	Long-sleeved shirt, long pants, chemical-resistant gloves made of any chemical resistant material, closed-toed shoes and socks		Triclopyr, Amine
Triclopyr, ester	Element 4, Garlon 4 Ultra, Tahoe 4E, Forestry Garlon XRT, Relegate RTU	No	Non-ionic surfactant	Conifer site prep; cut/spray anytime but spring	Most hardwoods, southern pine, waxy species such as bay, gallberry, wax myrtle, and yaupon, forbs, dog fennel, pigweed, greenbriar, and morning glory, rhus	Grasses	During periods of active growth	Average soil half-life: 30 days; Microbial metabolism; can be extremely toxic to aquatic life; Mainly Foliar active, limited soil active	No; "Group D" carcinogen (not classifiable as human carcinogen)	Long-sleeved shirt, long pants, chemical-resistant gloves made of any chemical resistant material, closed-toed shoes and socks		Triclopyr, Ester