



Crabgrass and Goosegrass Control in Cool Season Turfgrass

Dr. Stephen Hart, Specialist in Weed Science

Life Cycle

Spring and summer germinating annual grasses such as crabgrass (*Digitaria* spp.) and goosegrass (*Eleusine indica*) are among the most common and troublesome weeds infesting New Jersey turfgrass. Crabgrass seeds normally begin germinating after April 10 in Southern New Jersey and by April 20 in Central and Northern New Jersey. Goosegrass seeds generally begin germinating after May 30. Most of the crabgrass seeds germinate by mid-July, but large numbers of goosegrass seed will continue to germinate throughout summer. As the plants mature, seedheads are produced and mature seeds fall to the ground providing next year's crop of crabgrass and goosegrass. Crabgrass and goosegrass plants are then killed by early frosts in the fall.

Cultural Control

Growing a healthy, dense, and vigorous turf is one of the better methods for reducing the potential infestation of crabgrass and goosegrass in turf. A vigorous, thick turf shades the weed seedlings and greatly reduces seed germination. In thin, weak turf, crabgrass is one of the first weeds to invade. Several management practices will help to reduce weed encroachment. The following six steps can lead to healthy, dense, and vigorous turf, which will resist weed invasion:

- Plant high quality seed of recommended cultivars.
- Plant seed of cool-season grasses between late August and early October. Avoid spring or summer seedings.
- Soil Fertility testing should be performed every 2 to 3 years. Apply phosphorus, or potassium based on recommendations of the soil test report. Fertilize cool-

season turfgrass in fall with slow release nitrogen fertilizer. Leave grass clippings to recycle nutrients which helps sustain soil fertility and provides for a healthy vigorous turf that is more competitive against weeds.

- Reduce soil acidity with lime as recommended by a soil test.
- Mow lawns at the recommended height (2.5 to 3.5 inches for Kentucky bluegrass, perennial ryegrass, and fescues).
- When irrigating, apply water when turf begins to wilt (i.e. turf develops a blue-gray color and "footprinting" occurs). Water deeply by wetting the soil to a 4- to 6-inch depth. Frequent, light watering greatly encourages crabgrass and goosegrass encroachment, discourages deep rooting, and lowers the environmental stress tolerance of turfgrasses.

Crabgrass and goosegrass can be controlled with herbicides. There are two types of herbicide applications. The first type, "PREEMERGENCE," prevents the germination and growth of crabgrass, goosegrass, foxtail and many other weeds. The second type, "POSTEMERGENCE," kills emerged and actively growing plants.

Preemergence Herbicides

Preemergence herbicides are generally more effective and easier to apply than postemergence herbicides. Preemergence herbicides must be applied prior to crabgrass germination (April 10 in Southern New Jersey and April 20 in Central and Northern New Jersey) to be effective. If goosegrass, but not crabgrass, is a problem, the preemergence herbicide application may be delayed until early/mid-May.

Application Rates

Most preemergence herbicides can be used within a range of application rates as specified on the herbicide label. The rate range depends on several factors including: tolerance of the turfgrass species to the herbicide, the target weed species (crabgrass or goosegrass), weed infestation level, and if an additional application of the herbicide is to be made. In general, if high levels of crabgrass/goosegrass control have been obtained in previous years (resulting in a low potential for weed infestation) and the site is well maintained, the lower application rates should provide season-long weed control. However, if crabgrass infestation levels are high or if goosegrass is a significant problem, the herbicide may be applied at a higher rate. In addition, the herbicide label may recommend an additional application 6 to 8 weeks later to obtain the most consistent levels of season-long control of crabgrass and goosegrass.

Descriptions of commercially available preemergence herbicides for annual grass control in turfgrass are listed below. Since many different formulations of these herbicides are available, all recommended use rates are specified as pounds of active ingredient per acre (lbs ai/A).

Benefin

Trade Name: Balan

Chemical Name: N-butyl-N-ethyl-2,6-dinitro-4-(trifluoromethyl)benzenamine

Formulations: Granular, dry flowable or combinations with fertilizer

Comments: Benefin is safe to use on established Kentucky bluegrass, tall fescue and perennial ryegrass. Benefin should **not** be used on bentgrass, fine fescues, or newly seeded turf. For crabgrass, use 1.5 to 2.0 lbs ai/A. For goosegrass, use 2.0 lbs ai/A. Two applications of benefin (2.0 + 2.0 lb ai/acre), 6 to 8 weeks apart, may be needed to obtain the most consistent levels of season long control of crabgrass and goosegrass in New Jersey. Reseeding should be delayed at least 6 weeks after application of benefin and it is suggested to delay reseeding 12 to 16 weeks if the highest application rates of benefin are used.

Benefin + Trifluralin

Trade Name: Team, Team Pro

Chemical Name: Benefin (see above) + 2,6-dinitro-N,N-dipropyl-4-toluidine-(trifluoromethyl)benzenamine

Formulations: Granular or in combination with fertilizer

Comments: Team and Team Pro is safe to use on Kentucky bluegrass, tall and fine fescue, perennial ryegrass, and bentgrass turf. Team and Team Pro should **not** be used on golf course putting greens. Use Team and Team Pro on established turf only, do **not** apply to seedling grasses. Recommended application rates range from 1.5 to 3.0 lbs ai/A. Use higher application rates on sites with high levels of crabgrass infestation or where goosegrass is a significant problem. Two applications of Team Pro (1.5 + 1.5 lb ai/acre), 6 to 8 weeks apart, may be needed to obtain the most consistent levels of season long control of crabgrass and goosegrass in New Jersey. Reseeding should be delayed 8 to 16 weeks after application depending on the use rate.

Bensulide

Trade Name: Betamec, Betasan, Lescosan, Pre-San, and others

Chemical Name: O,O-bis(1-methylethyl) S-[2[(phenylsulfonyl)amino]ethyl] phosphorodithioate

Formulations: Granular, liquid or in combinations with fertilizer

Comments: Bensulide is safe to use on established Kentucky bluegrass, tall and fine fescue, perennial ryegrass, and bentgrass. Bensulide is one of the few products available for use on bentgrass putting greens. Bensulide should **not** be used on newly seeded turf. Recommended use rates for crabgrass control range from 7.5 to 12.0 lbs ai/A. However, more consistent control of crabgrass will be obtained with two applications of bensulide at rates ranging from 7.5 to 12.0 lbs ai/A spaced 6 to 8 weeks apart. Even with two applications, control of goosegrass may be inconsistent with bensulide. Reseeding should be delayed at least 4 months after application of bensulide.

Dithiopyr

Trade Name: Dimension

Chemical Name: S,S-dimethyl 2-(difluoromethyl)-4-(2-methylpropyl)-6-trifluoromethyl)-3,5-pyridinedicarbothioate

Formulations: Liquid (emulsifiable concentrate), wettable powder, granular, and fertilizer combinations.

Comments: Dithiopyr is safe to use on Kentucky bluegrass, tall and fine fescue, perennial ryegrass, and creeping bentgrass. Dithiopyr may be used on creeping bentgrass putting greens. However, dithiopyr should **not** be used on newly seeded turf. In addition, dithiopyr should **not** be used on colonial bentgrass, some varieties of creeping bentgrass and fine fescue. Recommended use rates range from 0.38 to 0.5 lbs ai/A. Single applications of dithiopyr at 0.38 lbs ai/A will generally provide season-long control of both crabgrass and goosegrass in New Jersey. More consistent control may be obtained with two applications of dithiopyr at 0.25 lbs ai/A spaced 6 to 8 weeks apart. Research has shown that granular and fertilizer formulations of dithiopyr may provide more consistent weed control than liquid (emulsifiable concentrate) formulations.

Dithiopyr also provides effective postemergence control of crabgrass but not goosegrass. For postemergence control, dithiopyr should be applied to 1- to 4-leaf stage crabgrass at 0.25 to 0.38 lb ai/acre for granular formulations and at 0.5 lb ai/acre for the emulsifiable concentrate. Tillered crabgrass will not be effectively controlled by postemergence applications of dithiopyr. Reseeding should be delayed for 3 months following application of dithiopyr.

Oxadiazon

Trade Name: Cipco Ronstar G

Chemical Name: 3-[2,4-dichloro-5-(1-methylethoxy)phenyl]-5-(1,1-dimethylethyl)-1,3,4-oxadiazol-2-(3H)-one

Formulations: Granular and wettable powder

Comments: Oxadiazon is safe to use on established Kentucky bluegrass, tall fescue, perennial ryegrass and bentgrass. Oxadiazon should **not** be used on newly seeded turf, fine fescues, or golf course putting greens. Although a wettable powder formulation is available, it is not labeled for use on cool-season turf. Recommended application rates range from 2.0 to 4.0 lbs ai/A. Use higher application rates on sites with high levels of crabgrass infestation. One spring application of oxadiazon at 3.0 to 4.0 lbs ai/acre will give season-long control of annual grasses including goosegrass. Oxadiazon is the most effective preemergence herbicide available for control of goosegrass in turf. Oxadiazon is also labeled for fall applications at 3.0 to 4.0 lbs ai/A for control of crabgrass and goosegrass the following spring/summer. However, expect control to be more inconsistent as compared to spring applications. Reseeding should be delayed 4 months following application of oxadiazon.

Pendimethalin

Trade Name: Lesco Pre-M; various O.M. Scott labels (such as Turf Weedgrass Control, Weedgrass Control 60 WDG, and others); Pendimethalin, Pendulum

Chemical Name: N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine

Formulations: Liquid (emulsifiable concentrate or aqueous based capsule suspension), water dispersible granular (WDG), granular, and fertilizer combinations.

Comments: Pendimethalin is safe to use on established stands of Kentucky bluegrass, perennial ryegrass, tall and fine fescue. Some formulations (Granular and WDG) can be used on bentgrass maintained at a mowing height of at least 0.5 inches. Do **not** use pendimethalin on golf course putting greens. On new seedings, wait until grass has been mowed at least four times and has filled-in before applications of pendimethalin. Recommended application rates range from 1.5 to 2.0 lbs ai/A for crabgrass and 1.5 to 3.0 lbs ai/A

for goosegrass. Use higher application rates on sites with high levels of crabgrass or goosegrass infestation. Two applications of pendimethalin (1.5 + 1.5 lb ai/acre), 6 to 8 weeks apart, may be needed to obtain the most consistent levels of season-long control of crabgrass and goosegrass in New Jersey. Pendimethalin will provide some preemergence control of oxalis, spurge and other broadleaf weeds. Reseeding should be delayed 3 months following application of pendimethalin.

Prodiamine

Trade Name: Barricade, Endurance

Chemical Name: 2,4-dinitro-N³,N³-dipropyl-6-(trifluoromethyl)-1,3-benzenediamine

Formulations: Liquid, water dispersible granular (WDG), and fertilizer combinations.

Comments: Prodiamine is safe to use on Kentucky bluegrass, perennial ryegrass, tall fescue, and creeping bentgrass. Use on mature turf only (60 days after establishment or two mowings, whichever is longer). Do **not** use on colonial bentgrass or golf course putting greens. Although the label specifies application rates based on the tolerance of the turf species, research has shown that a single spring application of the 65WDG formulation of Prodiamine at 0.50 to 0.65 lb ai/acre will effectively control crabgrass and goosegrass. The higher rate is suggested where goosegrass or chronic high levels of crabgrass occur. In general, higher rates (i.e., 30.75 lb ai/A) of prodiamine are suggested when using granular formulations with fertilizer. Barricade may also be applied in the fall for control of crabgrass and goosegrass the following spring/summer. However, expect control to be more inconsistent as compared to spring applications. Reseeding should be delayed 4 to 6 months depending on the rate of prodiamine used.

Siduron

Trade Name: Tupersan and others

Chemical Name: N-(2-methylcyclohexyl)-N'3-phenylurea

Formulations: Wettable powder, granular or in combination with fertilizer

Comments: Siduron is safe to use on established and newly seeded Kentucky bluegrass, tall and fine fescues, perennial ryegrass and some cultivars of creeping colonial bentgrass (consult label for specific cultivars). Following label recommendations, siduron can be safely used at the time of, or immediately following, seeding of tolerant grasses. Two or more applications of siduron, 3 to 5 weeks apart are necessary if satisfactory annual grass control is to be achieved in seedling turf. See the label for proper use rates on seedling turf. Siduron is not likely to control goosegrass. There are no turfgrass reseeding restrictions for siduron.

Except as otherwise noted, most of these herbicides provide good to excellent season-long crabgrass control when used properly.

Suggestions for improving control are as follows:

- Consult the label in detail to determine application rates and turfgrass tolerance.
- Avoid skips and overdoses. Ensure uniform coverage by applying half the recommended rate in two directions (at right angle to each other).
- Apply at least 1 to 2 weeks before weeds germinate; generally early/mid April for most regions in New Jersey.
- Water in immediately and thoroughly after chemicals are applied.
- **Do not** disturb the soil surface (by aerifying, spiking, or verticutting) after chemicals have been applied until fall.

Note: The actual chemical name of each herbicide that must appear on the container was listed above. Take this publication with you when shopping and compare names to be sure you are buying the chemical you desire. Preemergence herbicides usually provide the easiest and perhaps most economical approach to summer annual grass weed control.

Postemergence Herbicides

Postemergence herbicides are used to kill weeds after they germinate and emerge from the soil. Crabgrass and goosegrass are easiest to control with postemergence herbicides when they are small, and in the 2- to 4-leaf stage of growth. This normally occurs in early July in most areas of New Jersey. The most common postemergence herbicides used for annual grass control in turf are organic arsenicals, dithiopyr (early postemergence only), fenoxaprop, and quinclorac. Only fenoxaprop is effective for control of goosegrass.

Chemical Names of Organic Arsenicals:

AMA:	Ammonium methanearsonate
DSMA:	Disodium methanearsonate
MAMA:	Monoammonium methanearsonate
MSMA:	Monosodium methanearsonate
Trade Names:	Methar 30, Weedone Crabgrass Killer, Ortho Crabgrass and Dandelion Killer, Super Methar, Daconate 6, DSMA and others.
Formulations:	Granular and liquid, either alone or in combination with other herbicides
Comments:	These postemergence herbicides are most effective when applied to seedling crabgrass plants. The organic arsenicals are not effective in controlling goosegrass. Generally, two and sometimes more treatments are needed, and they should be made at 7-to 10-day intervals. Soil should be moist before treatments are made. Desirable turfgrasses may be temporarily discolored after treatment, especially if under stress from heat or drought. Spray formulations are more effective than granular forms. Follow directions on the container for rates to apply. Do not irrigate for 24 hours after they are applied and do not apply if rain is forecast within 24 hours of the day you intend to apply the herbicide.

Dithiopyr

Comments: Use of dithiopyr and other relevant information about this chemical is outlined

above in the section on preemergence herbicides. Dithiopyr only provides early (i.e. 1- to 4-leaf stage) postemergence control of crabgrass. Little information exists regarding its ability to control other annual grasses after emergence and therefore dithiopyr is currently labeled only for postemergence crabgrass control. Dithiopyr should not be used on creeping bentgrass as a postemergence herbicide, but it is safe to apply postemergently to most other turfgrass species.

Fenoxaprop

Trade Name:	Acclaim Extra
Chemical Name:	(±)-2-[4-[(6 chloro- 2-benzoxaolyl)oxy]phenoxy]propanoic acid
Formulations:	Sprayable (emulsifiable concentrate)
Comments:	Fenoxaprop is safe to use on established perennial ryegrass and tall and fine fescue. Fenoxaprop may stunt or discolor Kentucky bluegrass, especially if applied when Kentucky bluegrass is succulent and rapidly growing or under stress from heat or drought. Fenoxaprop may be used at low rates on bentgrass. Carefully consult label for use on bentgrass and do not use on golf course putting greens. Fenoxaprop is relatively safe (may cause yellowing) to apply to seedling tall fescue and perennial ryegrass seedlings that are more than 4 weeks old. However, fenoxaprop may severely injure seedling Kentucky bluegrass less than 1 year old. Fenoxaprop controls crabgrass, goosegrass, and other annual grass weeds. Apply when crabgrass is just above the turf canopy (usually early July), but prior to the time when weeds have developed 4 or more tillers. There must be good soil moisture and actively growing weeds for fenoxaprop to be effective in a single application. Due to antagonism within the weed (i.e., not the spray tank), fenoxaprop should not be tank mixed with a broadleaf weed herbicide or be applied within 14 days following a broadleaf weed herbicide application. A broadleaf weed herbicide may be applied 24 hours after fenoxaprop without diminishing the ability of

fenoxaprop to control annual grass weeds. Do **not** mow treated turf within 24 hours of application. Fenoxaprop is more effective when applied through flat fan nozzles. Effectiveness may be reduced by nozzles such as flood jet nozzles that produce large droplet sizes. The recommended rate of fenoxaprop will vary (0.016 to 0.17 lb ai/acre) depending on turf species, weed size, vigor and other factors noted on the label. Multiple applications are generally needed for goosegrass control because this weed germinates throughout the summer and fenoxaprop alone has no preemergence activity. Fescues and ryegrass may be reseeded immediately following application of fenoxaprop. However, delay the reseeding of all other turfgrass species for 21 days.

Quinclorac

Trade Name: Drive

Chemical Name: 3,7-dichloro-8-quinolinecarboxylic acid

Formulations: Dry flowable

Comments: **The quinclorac herbicide label has significant label changes for 2002. Carefully review a new label prior to use.** Quinclorac may be used in established Kentucky Bluegrass, perennial ryegrass and tall fescue at rates up to 0.75 lbs ai/A. The current label allows use on fine fescue when it is part of a blend. The tolerance of creeping bentgrass to quinclorac appears to be a function of bentgrass variety, environmental conditions and cultural practices such as mowing height. Single Application rates on creeping bentgrass should not exceed 0.5 lbs ai/A. **It is strongly recommended that a small area of bentgrass be tested for tolerance**

to quinclorac before applications are made to large areas. Newly seeded Kentucky bluegrass, perennial ryegrass, and creeping bentgrass should be at least 4 weeks old prior to quinclorac applications. For effective weed control, quinclorac must be applied with an oil based adjuvant such as a crop oil concentrate or methylated seed oil. Quinclorac will control young untillered crabgrass as well as mature, multi-tillered plants. However control of crabgrass with one to five tillers is inconsistent. Unlike fenoxypop, quinclorac has soil residual activity and will provide approximately 20 to 30 days of residual crabgrass control. **Quinclorac will not control goosegrass.** Quinclorac will effectively control clovers and most speedwells but is weak or ineffective against other broadleaf weeds. Quinclorac can also be use prior to the germination of newly seeded and over seeded tall fescue and perennial ryegrass. It may also be applied 7 days or greater prior to overseeding all cool-season turfgrass species.

A weed control program must be accompanied by a good turf management program. When weeds are removed, large bare areas should be sodded or reseeded in the fall as these open spaces will be invaded by new weeds. Proper fertilization, irrigation, and mowing greatly reduce and often eliminate significant crabgrass or goosegrass problems in turf.

Caution

Herbicides can be poisonous, but they may be used safely if you **HANDLE THEM WITH CARE**. Use only the recommended rates. **Follow directions and precautions on the label.** Store all pesticides out of the reach of children and animals and away from feed, seed and foodstuffs. References to trade names do not constitute an endorsement or warranty by Rutgers, The State University of New Jersey. No discrimination is intended against products not mentioned.

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