



Pronamide-treated plants showing a range of root injury. Notice how chlorotic the plants are from trying to germinate in the pronamide residue. Photo by the Washington State University Department of Crop & Soil Sciences.

Is there such a thing as weed prevention?

If you are like me, you spend a lot of time pulling, hoeing, and sometimes cursing weeds in your lawns, landscapes, and gardens. There are many different types of plants we consider weeds, including winter annuals, summer annuals, perennials, and even tree seedlings. Personally, I am trying to train the squirrels to plant (and forget) burr oak acorns so that I will eventually have a forest, but they are not paying attention to the boundaries I've established.

What's pre-emergent control?

Many folks would like to manage weeds in a way that might lessen the need for mechanical removal during the spring, summer, and fall. If you choose to use pesticides (yes, herbicides are pesticides) to manage your weeds, there is a class of chemicals considered to be **pre-emergent** herbicides. However, if you don't understand how they work, you may end up using them incorrectly.

As defined by the National Institutes of Health, "**Dinitroanilines** are broad-spectrum pre-emergence herbicides currently used for weed control in conventional agriculture [and by homeowners]. They are considered extremely safe agrochemicals because they act specifically on tubulin proteins and inhibit shoot and

root growth of plants."

Do you need to know what tubulin proteins are? No, but make note of the idea that dinitroanilines (pronounced die-nitro-ann-uh-lins) "inhibit shoot and root growth." When used and applied correctly, these products prevent the root growth of seedlings, and eventually kill the plants as they emerge. These products are considered very effective on **annual grasses** and **small-seeded annual broad-leaved weeds**.

Pre-emergent products are important in homeowner landscapes because, when used correctly, they have little impact on established trees, shrubs, or other perennials (including turf), but do a really nice job of managing weeds.

Timing

Since these products kill germinating weed seedlings, it is critical to apply them prior to weed seed germination. Unlike most herbicide chemistry, pre-emergent products are preventative, which means application must occur before you know that the weeds are there.

If you have lived in the same location for several years, you probably know where your problem areas are.

If you haven't been there long, you may need to go through a couple of seasons to understand which weeds are an issue and where.

For many weeds, the application timing in Wyoming is generally before the middle of May, but it depends on the specific weed you are trying to control. For example, pendimethalin can be used as a pre-emergent for puncturevine in central Wyoming as late as the second week of June (which could be too late for the eastern side of the state), but it needs to be watered or raked in well to ensure it is incorporated. The homeowner may still need to handpick a few early germinators.

Incorporation

All dinitroanilines require some form of incorporation into the soil profile. Incorporation gets the herbicide into the soil—where the weed seeds are—and prevents the herbicide from volatilizing

(evaporating) and losing its ability to control the weeds.

The best incorporation methods are to time the application prior to rain, mechanically water the herbicide in, or physically incorporate it using a rake or hoe. Many of these products need to be incorporated $\frac{1}{2}$ inch into the soil profile, where small-seeded annual broadleaf weeds and grass seeds germinate. A 1-inch rainfall will incorporate the herbicide to $\frac{1}{2}$ -inch depth in the soil profile.

Dinitroanilines are not very water soluble and do not readily leach through the soil profile—they generally stay where you put them.

If spraying dinitroanilines, do not let them sit in the sprayer tank for any significant length of time, and don't mix more solution than is required.

Activation

Unlike conventional herbicides, which shouldn't be applied before a

rain event, pre-emergent products require soil moisture to be activated. Weed seeds also need moisture to germinate, begin root growth, and come into contact with the herbicide-treated soil. As the weed seeds germinate, they seek out water and soil; when the seedlings' roots contact the herbicide, they stop growing and die.

Dinitroanilines create a treated soil barrier, similar to composting or mulching. This barrier can be broken via mechanical manipulation, such as digging, later tillage, or movement of treated soil. These methods break through the treated zone and allow weed seeds to germinate.

Dinitroaniline chemistry is characteristically bright yellow to nearly fluorescent orange (sometimes these products are referred to as "yellows"). They will temporarily (7 to 10 days) discolor the treated area, depending on how much rainfall is received after

Credit: University of Delaware Pesticide Safety Education Program, with support from EPA PSEPFMP funds, and Jeremy Cain, University of Wyoming Extension.

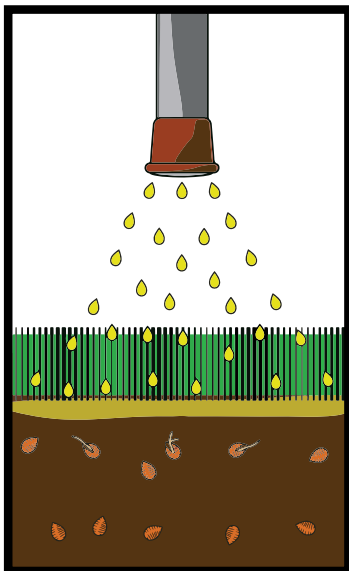


Figure 1a. Application of the dinitroaniline (can be either liquid or dry).

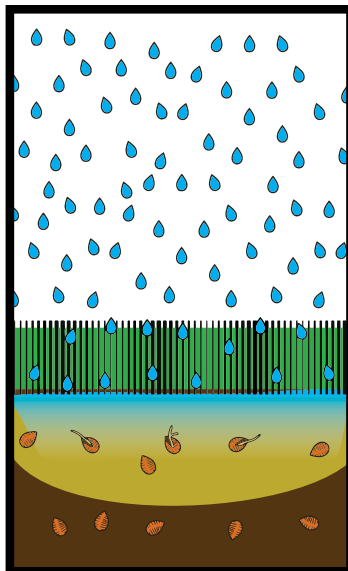


Figure 1b. Incorporation is critical for these herbicides and can be either mechanical (raked in) or via water/rainfall. Soil moisture is required for these products to work as they should.

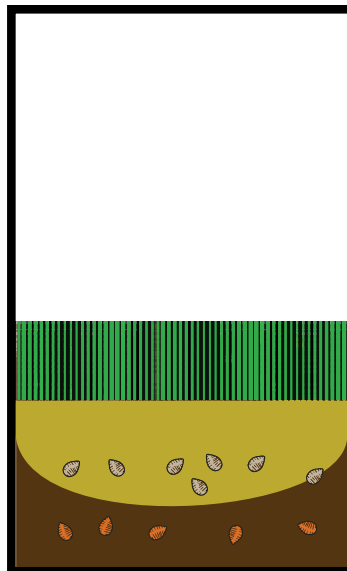


Figure 1c. Seeds in the treated zone will germinate and die.

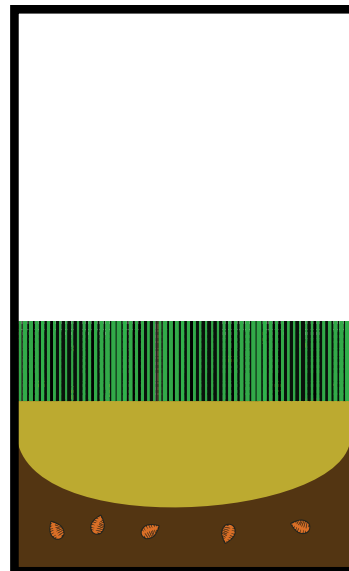


Figure 1d. Seeds below the treated zone might germinate; if the roots are outside of the treated zone, you may start to see weed seedlings about 30-45 days after application.

application. This coloration makes it easy to see where dinitroanilines have been applied to bare soil or turf, but can cause permanent stains on plastic.

Many pre-emergent products have what is considered a 45-day half-life, which means you may start to see weeds germinating about 45 days after application. Depending on the use and the label directions, a second application may be useful approximately 45 days after the initial application.

Unlike contact herbicides, these products will not kill a plant that has already germinated. Weeds that have germinated must be removed by other means.

Use it wisely

Everything you do to prevent weeds will help with the management of all weeds. If you choose to use pesticides, be sure to read, follow, and understand the label instructions. Rotate herbicides with different modes of action to prevent resistant populations of weeds from becoming a greater problem than when you started. Lastly, do not rely solely on one type of control mechanism.

If you have additional questions concerning the use of pre-emergent products, contact your local extension office, weed and pest district, or local ag co-op.

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Weed, feed, and seed

When considering the purchase of a product like weed and feed, keep in mind that pre-emergent herbicides that combat crabgrass will also keep grass seed from emerging. This could be a problem when overseeding. Consult the label for plant-back intervals, as some are more than 12 months.

The image shows a green banner for the 'Barnyards & Backyards' magazine. On the left is a small thumbnail of the magazine cover, which features a bird and the text 'BARNYARDS & BACKYARDS' and 'SPRING 2023'. The main part of the banner has the title 'BARNYARDS & BACKYARDS' in large, stylized letters, with '1 YEAR FOR ONLY \$13!' below it.

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