

Using PGRs

on Plugs



Knowing which chemical to use under which circumstances can mean the difference between a successful crop and a waste of time and money.

By Roger Styer

Here it is, the middle of the plug season, and plug growers are wondering how to keep their plugs from stretching or flopping. With short days and low light conditions in much of the country during this time of the year, small seedlings want to stretch while the roots take their time growing. And, once the weather warms up, many of the plug crops will really take off, catching growers by surprise.

To control plug growth, you need to understand the “gas v. brake” concept. When you learned to drive a car, you were told to put your foot on the gas to make the car go and to take the same foot off the gas and put it on the brake to make the car slow down or stop. As growers, we tend to “keep the pedal to the metal” while trying to put on the brake. This occurs because many plug growers fail to understand what makes a plant grow. As temperature increases between 50 and 80° F, both shoot and root growth increase. Below or above this range, growth slows down dramatically. When light levels on the leaf are 3,000 ft. candles, photosyn-

thesis is maximized, and both roots and shoots get enough food. With lower light levels, the shoots get first priority on the food. With drier growing conditions, root growth is improved, and under higher humidity, shoot growth stretches. Feeding plugs with fertilizers high in ammoniacal nitrogen (NH_4) and phosphorus (P) will cause more shoot growth and stretching, whereas fertilizers high in nitrate nitrogen (NO_3) and calcium (Ca) promote tone and root growth. Increasing carbon dioxide (CO_2) levels above ambient, 1,000 ppm, will promote both roots and shoots (see Table 1 page 43).

When plug growers control the above factors, they can minimize the amounts of chemical growth regulators used and still produce a better quality plug. However, chemical growth regulators will still need to be used on many crops. The key is to understand which growth regulator works best on which crop, under what circumstances and at which levels. Knowing when to apply the right chemical for a particular crop is usually learned by painful trial and error. Varieties may react quite differently to the same chemical.

AVAILABLE CHEMICALS

There are a number of chemical growth regulators for use on plugs. One of the easiest to work with is B-Nine. This chemical is sprayed to run-off and takes a long time to get into the plant (leaves wet for up to eight hours). It enters plants through the leaves and stems but not the roots. B-Nine works on a wide range of crops (see Table 2 page 41) and works best in cooler weather where plugs do not grow as fast. Rates generally range from 2,500-5,000 ppm. B-Nine can be more effective when used with Cycocel in a tank mix, which will be covered later in this article. Too many applications of B-Nine or too high of a cumulative concentration tend to delay flowering and reduce flower size in some crops, particularly petunia and pansy. Avoid using B-Nine within one week of using copper fungicides, as phytotoxicity can occur.

Cycocel is labeled for a wide range of crops but works best on geraniums, begonias and dianthus (See Table 2 page 46). The best use of Cycocel is as a tank mix with B-Nine. Cycocel, like B-Nine, takes a long time to get into plants

(up to eight hours). It enters plants through leaves and stems and can be used as a drench but rates (and cost) are prohibitively high. Spray rates commonly used on plugs range from 250-1,500 ppm. Too high of a concentration will produce a leaf yellowing or halo effect, a form of phytotoxicity. Spray Cycocel as a drift onto dry foliage and when plants are not under stress. Make sure to note weather conditions to ensure the chemical will stay on the plant long enough for absorption.

A-Rest works much better than B-Nine or Cycocel alone and is safer to use than Bonzi or Sumagic on many plug crops (See Table 2 page 46). It can be applied by spray, sponch or drench and is absorbed quickly (within 30 minutes), entering plants through leaves, stems and roots. Spray rates generally range from 1-15 ppm. A-Rest works very well on pansy, vinca, salvia, snapdragon and dianthus but is not effective on impatiens. Cost per application is insignificant when compared to ease of application, plant safety and performance.

Bonzi and Sumagic are similar chemicals and work the same way. Both chemicals are labeled for a wide range of crops; enter the plant quickly (within 30 minutes) through stems and roots; and can be sprayed, sponched or drenched. Since both Bonzi and Sumagic are very strong, overdosing is likely during cool weather or with slow-growing varieties. Common spray rates for Bonzi range from 1-30 ppm, and for Sumagic from 1-15 ppm. Generally, for Sumagic, rates are 1/5-1/2 that of



Looking for Chemicals?

A-Rest	SePro	(317) 580-8291	www.sepro.com
B-Nine	Uniroyal	(203) 573-3025	www.uniroyalchemical.com
Bonzi	Uniroyal	(203) 573-3025	www.uniroyalchemical.com
Cycocel	Olympic	(800) 659-6745	www.olympichort.com
Florel	Monterey Chemical	(559) 499-2100	www.montereychemical.com
	Southern Ag	(941) 722-3285	www.southernag.com
Sumagic	Valent	(800) 624-6094	www.valentpro.com

Bonzi. The main problem with these chemicals is the application method, not the rate. Growers must be careful to apply Bonzi or Sumagic consistently each time and avoid drifting onto sensitive crops such as begonia and dusty miller.

Florel is an ethylene-producing chemical used for height control, branching and disbudding. Florel is labeled for a wide range of crops and is most commonly used with vegetatively-propagated material to replace pinching and improve branching. Florel can be applied as a spray but takes a long time (up to eight hours) to get into the plant through the leaves and stems. Spray rates range from 250-500 ppm. Water pH of the spray tank after mixing in Florel should be 4.0-4.5 for best activity. Avoid spraying plants when under stress, as Florel will exaggerate the stress and turn leaves yellow. Florel has been successfully tested on pansy plugs to improve branching after transplanting during warm weather.

TANK MIXES

Many plug growers are experimenting with tank mixes, combining two growth regulators to achieve a greater effect than either separately or to lessen negative effects of a particular chemical. The most common tank mix is B-Nine and Cycocel. Spray rates are usually set to control the Cycocel halo effect, with the B-Nine rate adjusted for best control. Tank mix rates can

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start at 250 ppm Cycocel plus 500 ppm B-Nine and go up to 1,500 ppm Cycocel plus 2,500 ppm B-Nine during the warmest weather and on vigorous varieties. Table 2 page 46 shows a list of crops that benefit from this tank mix. This tank mix will control height more than either chemical separately, so avoid using rates that are too high. Since both chemicals take a long time to get into the plant, try to keep foliage wet as long as possible.

Another tank mix that some growers are using combines B-Nine with A-Rest. Rates generally range from 3-10 ppm A-Rest, combined with 1,250-5,000 ppm B-Nine. This mix works well on pansies, petunias and some perennials, as well as other crops. Advantages include less cost for A-Rest alone, less total B-Nine going into the crop to reduce flowering and less overdosing likely. The difficulty lies in the fact that B-Nine takes a long time to get into the plant, whereas A-Rest doesn't. Use of this mix during warm, dry weather may not give results as good as A-Rest alone.

B-Nine can also be combined with Bonzi to lessen the negative effects of higher rates of Bonzi and the flowering delay of too much B-Nine. Rates range from 5-20 ppm for Bonzi and 1,250-5,000 ppm for B-Nine. Chemical costs are less than using the separate chemicals, but spray volume is still a factor. This tank mix works well on petunia, dianthus, celosia and some perennials, as well as other crops. Again, use of this mix during warm, dry weather may not give results as good as using Bonzi alone.

APPLICATION METHOD AND STAGE OF DEVELOPMENT

A-Rest, Bonzi and Sumagic can be applied to plugs as a spray, sprench or drench whereas B-Nine, Cycocel and Florel are only applied as a spray. A sprench is a combination spray and drench that uses spray or boom water equipment to apply a volume higher than a spray, obtaining more of a drench effect. Volumes can vary but might be 2-4 times that of a spray. Sprenches are typically done right after seeding and before germination is finished and cotyledons have totally expanded. The goal is to get the early roots to take up the chemical and control early hypocotyl stretch. Crops such as cosmos, marigold, zinnia and tall varieties of celosia and snaps will benefit the most from an early sprench. You can use A-Rest at 1-7 ppm, Bonzi at 1-5 ppm or Sumagic at 1/2-3 ppm. When covering seed with coarse vermiculite, it may take a higher concentration or more volume to get past the vermiculite.

Sprays are most commonly done on plugs when height control is needed. Typical volume is 2-3 quarts per 100 sq. ft. Optimum chemical concentrations are highest in sprays, and there may be some sprenching effect with A-Rest, Bonzi and Sumagic when leaves do not totally cover the plug media surface. B-Nine and Florel are sprayed to run-off; Cycocel is sprayed to glistening; and A-Rest, Bonzi and Sumagic need to be more carefully monitored for volume and area covered. Generally, the first growth regulator sprays will be done when first true leaves have emerged and repeated every 7-14 days. When spraying Bonzi or Sumagic, not all crops need the same concentration (See Table 3 page 46). Adjust your concentration or speed of application (which affects volume of chemical applied) to account for different plug crops.

When plugs are fully grown, it is more difficult to spray successfully with Bonzi or Sumagic, as stems and roots are covered by leaves. Remember, Bonzi and Sumagic are not taken up by leaves. For plug growers who grow their own plugs and need to hold them before transplanting, a drench with

Table 1. Environmental and cultural factors promoting shoot or root growth.

Factor	Promoting Shoots	Promoting Roots
Temperature	Increasing (between 50°-80° F) +DIF	Increasing (50°-80° F) -DIF
Light Intensity	Low (< 1,500 fc)	High (> 1,500 fc)
Moisture	High	Low
Nutrition	High NH ₄ and P	High NO ₃ and Ca
CO ₂	High (1,000 ppm)	High (1,000 ppm)
Humidity	High	Low

crop cultivation

A-Rest, Bonzi or Sumagic may work better than a spray. A drench is an application in a large volume of water applied directly to the top of the media to get through the whole plug cell. If the volume increases, the chemical concentration

should decrease. You want the plug to grow out within 2-3 weeks after applying the drench. This delay will allow successful holding, as well as delaying spray applications after transplanting. Rates for an A-Rest drench range from 1/2-3

ppm, for Bonzi 1/4-2 ppm and for Sumagic 1/8-1 ppm. Conduct your own trials before drenching on a broad scale to make sure the plugs grow out when you want.

Table 2. Effective plug growth regulators.

Crop	B-Nine	A-Rest	Bonzi	Sumagic	B-Nine + Cycocel
Ageratum	+	+	+	+	+
Alyssum	+	+	+		
Begonia	+	+			+
Celosia	+		+	+	+
Coleus		+	+	+	+
Dahlia	+	+	+	+	+
Dianthus		+	+	+	+
Dusty Miller	+	+	+		
F. Kale/Cabbage	+		+	+	
Geranium		+	+	+	+
Impatiens	+		+	+	
Lobelia	+	+			
Marigold	+	+	+	+	+
Pansy	+	+			+
Petunia	+	+	+	+	+
Portulaca	+	+	+		
Primula	+	+			
Salvia	+	+	+	+	+
Snapdragon	+	+	+	+	+
Torenia			+		
Verbena	+		+	+	+
Vinca	+	+		+	+
Viola	+	+			
Zinnia	+	+	+	+	+

* Only effective in cooler climates.

** Can also use Cycocel alone.


NOTE: Important — these chemicals are not necessarily labeled for such use!

SPECIAL SITUATIONS

When reusing plug trays, growers need to take into account how much Bonzi or Sumagic residue is left on the surface from previous crops. The higher the spray rates, the more residue. The standard 15-minute dip for cleaning trays will not be sufficient to remove Sumagic or Bonzi. Trays need to be soaked for 45-60 minutes. Crops most sensitive to this residue include begonia, pansy and dusty miller.

Placement of sensitive crops can be a problem when spraying growth regulators. Try to group crops together that need Bonzi or Sumagic to avoid drifting onto sensitive crops. It is impossible to safely spray adjacent plug crops that have widely varying sensitivity to Bonzi or

Sumagic (See Table 3, left). Growers need to make sure they are not trying to spray too far away.

Not all varieties of a particular crop grow at the same rate. For instance, grandiflora petunias grow faster than multifloras. In addition, not all colors grow at the same rate. White petunias grow faster than pink, which is faster than red. Plug growers need to take into account these differences when spraying growth regulators. Know which varieties are slow and which are fast, and group them together in the greenhouse. 

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Table 3. Classification of some plug crops by optimum rate range for Bonzi and Sumagic.

Group	OPTIMUM RATE RANGE (PPM)		
	Bonzi	Sumagic	Crops
High	15 - 30	7.5 - 15	A. Marigold * Penta Petunia Salvia * Snapdragon *
Medium	7.5 - 15	2.5 - 7.5	Ageratum Celosia Coleus Dahlia F. Marigold * Verbena Most Other Crops
Low	2.5 - 7.5	0.5 - 1.5	Geranium Impatiens Pansy Vinca

* Sumagic works better than Bonzi.

** Note — Growers in North start with low end of rate or lower, especially during cooler weather.

*** Under retract greenhouse conditions (high light), can use low end of rate even if hot.



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