In our futuristic selection and propagation of plant material, we will incorporate the esthetic and functional merits of the plants into creating an environment unique for the needs and lifestyle of each gardener. We will be creating our new smaller gardens with an even greater sensitivity for the type of plant material used. It is our responsibility as propagators to provide this plant material in an efficient and useful manner.

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NEW HERBICIDES FOR THE NURSERY INDUSTRY

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We categorize herbicides as pre-emergence (those applied prior to seed germination) and post-emergence (those applied to existing weeds). Among the best of the Federally registered herbicides in the U.S. are the following with a brief statement as to why they are being used extensively.

PRE-EMERGENCE HERBICIDES

Dichlobenil (Casoron) is definitely not new, but the most *effective pre-emergence herbicide for control of perennial* weeds in field (not container) nurseries. The use of post-emergence herbicides such as glyphosphate have reduced the use of this product in recent years. It is volatile and its use is limited to autumn and early winter when soil temperature is 50°F or lower.

Napropamide (Devrinol) is one of the newer products used in container nurseries because it effectively controls chickweed and groundsel, two very troublesome weeds. Napropamide is alternated with Oxadiazon (Ronstar) in container nurseries but is also registered for field grown trees, deciduous

shrubs, evergreens, and ground covers. Incorporate with tillage or irrigation.

Metolachlor (Dual) — Quite new and not used extensively yet by nurserymen but effective for the control of most annual grasses and yellow nutsedge. To increase effectiveness, apply with Simazine (Princep) to control broadleaf weeds in field grown nursery stock.

Oryzalin (Surflan) — Similar to Treflan in weed control and safety but does not have be soil incorporated. This can be used in existing plantings. Use to control annual grasses, chickweed, purslane, lambsquarters, and pigweed, Oryzalin is labelled for use with shrubs, evergreens, ground covers, and flowers. It is becoming a more popular pre-emergence herbicide used by itself or in combination with Simazine or Glyphosate.

Oxadiazon (Ronstar) — In the past 5 years this material has become the number one container pre-emergence herbicide. It is effective against bittercress, common groundsel, galinsoga, smartweed, woodsorrel (*Oxalis*) and barnyardgrass, but not chickweed. Avoid application to wet foliage to prevent granules from attaching to the leaves and causing phytotoxicity.

Oxyfluorfen (Goal) — Effective against a wide spectrum of annual broadleaf weeds and annual grasses in conifer seedbeds, conifer transplants, and conifer container stock. Controls bittercress, groundsel, chickweed, and barnyardgrass, all difficult to control with other products.

Oxyfluorfen combined with Pendimethalin (Prowl) and marketed as Pro Grow Ornamental Herbicide II, is registered for a wide variety of field and container grown stock. The combination controls oxalis and spurge in addition to those weeds mentioned for oxyfluorfen alone.

Pronamide (Kerb) — Although this product is not new, it must be included because it is very effective in controlling perennial grasses and selected broadleaved species such as *Rumex* (dock). It can be applied directly to the existing weeds without cultivation. Most effective when used in combination with Simazine in autumn or early winter.

Simazine (Princep) — The standard herbicide against which all other products are compared. Controls annual grasses and broadleaved species. We recommend a 2.0-3.0 lb AIA application in autumn followed by a second treatment at 1.0-1.5 lb AIA in spring in combination with Napropamide, Dual, or other products effective against annual grasses. Usual-

ly not used in containers but is the standard for *Taxus*, shade and flowering trees, and many other crops.

POST-EMERGENCE HERBICIDES

Asulox (Asulam) — A systemic herbicide which controls annual grasses when applied as an over the top spray on juniper and *Taxus* only. It requires 4 to 6 weeks for effective control but this is longer than most nurserymen are willing to wait for weed control.

Fluazifop-butyl (Fusilade) is a recently labelled post-emergent herbicide that controls grasses but not broadleaf weeds. This is an over-the-top treatment which is safe to use with a broad range of woody landscape crops. Apply to grasses at 2 to 6 in. in height or before they become 18 in. high. The herbicide is slow to control the grasses, with 2 to 3 weeks an average time expectancy. Always use with a crop oil at rates on the label or a non-ionic surfactant.

Glyphosate (Roundup) controls annual and perennial grasses and broadleaf weeds. Use prior to planting or as a directed spray toward the base of certain plants. Most effective control of perennial weeds occurs when the weeds are in the flower bud or bloom stage of development. There is no soil residue.

Paraquat (Paraquat) is a contact herbicide used to control annual grass and broadleaf weeds in 2 to 3 days. A surfactant should be used. There is no soil residue. Use protective gloves while handling the concentrate to avoid contact with skin. Combined with simazine good residual activity can also be obtained.

Sethoxydim (Poast) is very similar in action to Fluazifop-butyl in effectiveness, use, and phytotoxicity. Poast has only 1.53 lb/gallon compared to 4.0 with Fusilade. Therefore, the dilution rates are different, as are the initial costs. However, in the final analysis both cost approximately $75 to treat an acre. Use at 20 to 25 gal/acre at 40 to 60 lbs pressure/sq. in. with crop oil for best control.

These herbicides represent only a portion of the 28 herbicides labelled for the nursery industry in the U.S. Many of those not described above, such as trifluralin, DCPA, EPTC, chloropropham, alachlor, 2,4-D, aminotriazole, and others are outstanding products but are not particularly new to the industry.

Remember when using new or older herbicides, read and follow label instructions including safety precautions. Store in original containers, in dry places away from children and pets.

If herbicides are swallowed, come in contact with eyes, or are absorbed to the point of showing symptoms call a doctor immediately. The most responsible person should supervise pesticide applications.

ADDITIONAL TRADE NAMES

Common Name	Trade Names
Pre-emergence	
Dichlobenil	Casoron, Decabane, Nurosac, Dylcomec
Metolachlor	Dual, Bicep, Codal, Cotoran Multi, Milocap, Ontrack, Primagram, Primextra
Oryzalin	Surflan, Ryzelan, Divimal
Oxyfluorfen	Goal, Koltar
Pendimethalin	Prowl, Herbadox, Stomp
Simazine	Princep, Aquazine, Cekusan, Gesatop, Primatol S, Simadex, Simanex
Post-emergence	
Asulam	Asulox, Asulox F, Asulox 40
Fluazifop-butyl	Fusalisade, Hache Uno Super, Onecide
Paraquat	Paraquat, Dextrone, Dexuron, Gramonol, Gramoxone, Gramuron, Herboxone, Pathclear, Terraklene, Totacol, Weedol

SUMMARY OF DISCUSSION

Questions were asked about control of marestail (*Equistum* spp.) in field-grown nursery stock. Various herbicides and methods were suggested, one being to use aminotriazole in August. Another was to apply glyphosate (Roundup) in late autumn, when foods are moved from the leaves down to the roots. The droplet size has an effect on "stickability", and Pollyfilla wallpaper paste mixed with Roundup to make a gel which can be painted on the weed works well. Another suggestion was to add diquat to the Roundup spray, as this enhances the effect on both marestail and bindweed.