

Weed Biology & Management

Biology and Management of Common Ragweed (*Ambrosia artemisiifolia* L.) in Christmas Tree Production



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Common ragweed (*Ambrosia artemisiifolia* L.) is an important weed species in Christmas tree production. It is a broadleaved herbaceous summer annual plant, which belongs to family Asteraceae. This weed is native to North and South America (USDA GRIN, 2020). *Ambrosia artemisiifolia* is also known as annual ragweed, low ragweed, American wormwood, Roman wormwood and tassel weed. (USDA GRIN, 2020 and NPIN, 2020). Common ragweed is considered as an invasive weed species (NPIN, 2020) which is highly competitive with other plants (Jordan et al., 2007). The plants emerge in late spring and bloom from July to October.

Biology of common ragweed

Common ragweed is found in a wide range of habitats (Fig. 1), such as cultivated fields, landscapes, orchards, roadsides, and unmaintained areas (Odero et al., 2011). It also grows profusely in open grasslands, Christmas tree production fields, and even in nurseries.

Common ragweed seeds remain dormant from fall throughout winter season. Seeds require winter chilling to overcome primary dormancy. Seeds start to germinate in April or May, emerging from soil depths of 2 inches or less. High temperatures usually inhibit seed germination (Hartzler and Vittetoe, 2020). The seedling stem and cotyledons are green, often having purple spots underneath. It is a short-day annual plant that can grow up to 24 inches in height. The stem is erect, hairy, green to purple in color with branching on the upper part. The leaves are compound, fern-like, pinnately divided, deeply cut into number of lobes, usually wider at base than at tips (Fig. 2). Lower leaves are arranged in an opposite manner while the upper ones are arranged in alternate fashion (FNA, 2006). Young leaves are hairy on the underside, but mature leaves are relatively hairless. It has a shallow taproot that produces an extensive fibrous root system (Jordan et al., 2007).

Series for Christmas Tree Production

The upper stems terminate into one or more flowering cylindrical spikes (Fig. 3) with small (1/8 inch), green male and female flowers borne on separate heads on the same plant. Male flowers are grouped on terminal spike-like heads, usually drooping, green in color, borne on 0.5-1.5 mm long peduncles. Female heads are present in axillary clusters below male flowers (FNA, 2006 and Odera et al., 2011). Common ragweed blooms from July to October. Each plant produces approximately 1 billion wind-dispersed pollen grains, which can be highly allergenic for people with hay fever. The flower color is green initially, which turns to yellow or brown on maturity.

Common ragweed sets seeds in late summer or early fall, producing 2-4 mm green to brown indehiscent fruits in clusters. A small single seed is enclosed within each fruit, which has several longitudinal ridges that end in short spines, looking like a crown (Odera et al., 2011). Common ragweed plants can produce 32,000 to 62,000 seeds per plant during the entire growing season (Jordan et al., 2007). The seeds are variable in size and are generally about 3.5 mm long and 2.5 mm broad. They are usually dispersed in proximity of mother plant, pertaining to the small size of seeds. The seeds have very little to moderate persistence in soil (Buttenschon et al., 2010). Common ragweed propagates by seeds or by rhizomes (NPIN, 2020). Generally, the seeds enter a dormancy period in winter season to germinate in next spring (Buttenschon et al., 2010).

Similar Species

Artemisia spp. or mugwort grows in similar habitats as common ragweed. Mugwort has similar coloration and leaf

structure as common ragweed but its flower clusters have both male and female flowers. In contrast, the male and female flowers of common ragweed are borne in separate clusters. *Ambrosia trifida* or giant ragweed (Fig. 4) is an annual plant with native range similar to common ragweed but differs in leaf size and shape. *Ambrosia coronopifolia* (perennial or western ragweed) is distributed in areas as that of giant and common ragweed but mostly occurs in dry habitats. The plants have bushy growth habit and leaves are not as deeply divided as common ragweed. (Buttenschon et al., 2010)

Management of Common Ragweed

1) Non-chemical Control

Prevention/ Mechanical Control:

The foremost way to control common ragweed is prevention of seed introduction into Christmas tree production areas. Frequent scouting for this weed is essential for control. If already present or established, the weed should be controlled right at emergence or pre-flowering stage by regularly monitoring the field to prevent seed spread at later stages. Mechanical control of common ragweed includes hand weeding or uprooting, hoeing, mowing or cutting the plants before flowering in Christmas tree production fields. Mulching with hay, wood chips, grass clippings or similar materials can also prevent seed germination or limit growth of germinated seeds (Buttenschon et al., 2010). Cultural or mechanical methods in combination with chemical control can provide effective control of the weed (Odera et al., 2011).



Figure 1. Common ragweed growing in its natural habitat. Photo credits: Debalina Saha, Dept. of Horticulture, MSU.



Figure 2. Close view of fern-like compound leaves of common ragweed. Photo credits: Debalina Saha, Dept. of Horticulture, MSU.



Figure 3. Upper stem terminating into flowering cylindrical spikes in common ragweed. Photo credits: Debalina Saha, Dept. of Horticulture, MSU.



Figure 4. Giant ragweed (*Ambrosia trifida*) is a similar species to common ragweed which differs in leaf size and shape. Photo credits: Howard F. Schwartz, Colorado State University, Bugwood.org



Biological Control:

Ground beetles (carabids) act as predators for common ragweed as they eat away seeds lying on the soil surface (Lundgren, 2005). In addition, the leaf beetle *Ophraella communa* can also be helpful for biocontrol of common ragweed by reducing its pollen production by about 82% (Schaffner et al., 2020).

2) Chemical control

The control of common ragweed by use of herbicides is best when seeds have started germinating or the plants are in early stages of development. Among the preemergence herbicides, Princep 4 L provides excellent control. Whereas, Aatrex 4 L, Gallery 75 DE, Goaltender 4 SC, and Sureguard 51 WDG are also good options as preemergent herbicides that can provide common ragweed control.

Postemergence herbicides are generally effective when the common ragweed is in early stage of growth and development before it has attained reproductive maturity. Roundup ultra 4 L is the best option as postemergent herbicide.

Goaltender 4 SC and Cobra 2 EC are other two postemergent herbicides that can provide good control of common ragweed.

The chemicals recommended for control of common ragweed vary in different states in the US since it has developed resistance to few groups of herbicides in different places. Common ragweed has been reported to be resistant to glyphosate in Berrien and Montmorency counties, ALS-resistant in Isabella county and resistant to synthetic auxin Clopyralid (Stinger) in Montcalm county of Michigan state (Hill, 2018). It has also been reported to be resistant to atrazine (Photosystem –II inhibitor) and cloransulam-methyl, imazamox, and imazethapyr (ALS inhibitors) in Michigan under nursery conditions and resistant to different groups of herbicides in field crops (corn, cotton, soybean) in most of the states of the United States (The International Herbicide-Resistant Weed Database, 2020). The postemergent application of glyphosate along with ammonium sulfate can result in an increased performance for common ragweed control as reported in Florida (Odero et al., 2011). In addition, application of 2,4-D, Saflufenacil (Sharpen) and methylated seed oil (1% v/v) can also provide common ragweed control (Odero et al., 2011).

To prevent further resistance development to other groups of herbicides in different regions, repeated use of a single herbicide with the same mode of action should be avoided and integrated weed management strategies need to be adopted by the Christmas tree growers. Combinations of herbicides or rotating herbicides with different modes of actions are recommended to avoid development of herbicide resistance among common ragweed species.▲

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