

PRODUCTION OF ERYNGIUM

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(John Njenga is currently a graduate student in our department working with Dr. Roy Larson on his Master's degree. John is researching cut flower production of eryngium with an emphasis in propagation.)

Alpine Sea Holly belongs to the family Umbelliferae (Apiaceae) in the genus Eryngium (Atwater, 1980). The common name is Alpine Sea Holly but it is also referred to as Eryngium. The name Eryngium is from eringion, an old Greek name for a thistle which some of the species' appearance seems to suggest. The plant is a herb with spiny leaves on the margins. The leaves are simple cut or lobed (Taylor, 1983). Eryngium is an excellent cut flower. There are several species which are suitable for use as cut flowers (Sansone, 1994).

Eryngium is a hardy perennial plant of great decorative value which grows from 2 to 3 feet high during the summer months (Everett, 1960). Aside from their use as a cut flower, sea hollies are also widely cultivated for the border or rock gardens (Everett, 1960).

Inflorescence Description

Eryngium has small flowers arranged in a tight globose head and each inflorescence is subtended by showy bracts (Armitage, 1993). The bloom head is somewhat thistle like. Leaves are also ornamental (Everett, 1960). Flowers are mainly blue in the cultivated varieties, but also can be white or green. The bloom calyx is showy and spiny toothed. The petals which are usually not conspicuous, are erect and stiff. Most cultivars are summer blooming (Taylor, 1983).

Popular Species and Their Characteristics

Eryngium is found wild chiefly in Southern Europe but some are native to North America. *Eryngium aquanticum* is a native of northeastern United States. The genus has over 200 species but the seven listed in the next column are the most popular (Taylor, 1983):

E. alpinum -- This species is about 2 feet high, has a bushy growth habit, and has 10 to 20 bracts per inflorescence. The leaves are triangular, heart shaped and bluish in color. The upper leaves may be trilobed. The flower heads are bluish purple. There is also a white variety. Hardy at -20 to -10 °F.

E. amethystinum--Grows to about 2 feet. Leaves are compound and deeply lobed. Flower heads are bluish purple in color and are usually 1/2 inch long. Bracts are lance or pinnatifid in shape. Hardy at -20 to -10 °F.

E. aquanticum -- A stout, bushy herb, growing 4 to 6 feet high. The leaves are stiff and very narrow. The flower heads are pale blue or whitish. Hardy at -20 to -10 °F.

E. bourgati -- The plant is hardly over 18 inches high. The leaves are almost round, stiff, spiny toothed and divided into 3 to 5 segments. The flower heads are 1/2 inch long and bluish purple. Hardy at -20 to -10 °F.

E. giganteum -- This species grows 5 to 7 feet high. The leaves are much branched or heart shaped. The upper leaves are trilobed. Flower heads are almost 4 inches wide and their color is blue or pale green. Bracts are long and green. Hardy at -10 to 0 °F.

E. oliverianum -- Usually 2 to 3 feet high. Leaves are undivided and upper ones are in 4 to 5 parts. The flower heads are 1 1/2 inches wide, blue or bluish purple in color. This species is of unknown hybrid origin. Hardy at -20 to -10 °F.

E. planum -- Usually less than 3 feet high. The leaves are undivided and the upper are 3 to 5 parts. The flower heads are blue and are about 1/2 inch wide. The bracts are rigid and very narrow. Hardy at -30 to -20 °F.

Propagation

Eryngium is commonly propagated by seed. It can also be multiplied by division where the plantlets growing at the base of the plant are carefully transplanted and also by cuttings. Mature root cuttings of 2 to 4 inches long sections will root when placed in a moist porous substrate at warm temperatures of 68 to 75 °F (Armitage, 1993). The weakness of Sea Hollies is that they are slow to recover from the shock of division, dislike being disturbed and are rather slow to establish after transplant. This is the reason why it may be better to set them out where they are likely to remain (Everett, 1960).

When propagating eryngium from seed, the seed should be ripe before it is collected. Freshly harvested seed should be sown immediately. Seeds of Eryngium become dormant soon after harvest. The main block to germination of seeds in this genus is the delay in embryo maturation which is enhanced by the presence of inhibitors until they are leached or neutralized (Atwater, 1980). Research conducted at the University of Georgia emphasizes the need to use fresh seed. Seeds of *Eryngium planum* germinate readily when fresh, however, it may take several months for seedlings to emerge, and many seed will not germinate at all if they are not fresh (Pinnel et al., 1985). The germination of Eryngium alpinum is less uniform and much slower than that of Eryngium planum.

Cultural Requirements

Sea Hollies thrive best in well drained, light and sandy soils (Everett, 1960). However, heavy clays can be made suitable by digging and mixing in gravel, sand and compost (Everett, 1960). The substrate should be kept reasonably moist during production (Taylor, 1983). Sea Hollies can tolerate saline soil conditions and they are fairly cold hardy. For flowering they require chilling temperatures of 40 °F or below. These environmental conditions can be met by field production, cold frames protection (in colder climates), or production in minimally heated

greenhouses. The crop can also tolerate hot summers (Armitage, 1993). Shading experiments have shown that field performance is reduced by shade although flower color is improved (Armitage, 1991). (Table 1).

Plants grown South of Zone 5 are of poor quality than those grown in more northern zones

Table 1. The effect of shade on yield and stem length of *Eryngium planum* in the third year of production.*

Percent shade	Yield (stems/plant)	Scape length (cm)
0	8.6	84.0
55	4.2	86.7
67	0.4	109.5

*From Armitage, 1989b.

which are of high quality but have shorter stems (Armitage, 1993).

Since Eryngium is a perennial crop it can last for several years in the field, however, for commercial production, 3 to 5 years is the average life span employed because the yield starts to decline thereafter. Although yield declines with plant age, the stem length and diameter are not affected. A closer spacing of 18 inches is used for plants rotated every 3 years, and a wider spacing of 3 feet is used for plants that will be grown more than 3 years in the field. Crop production under shade cloth is good for preventing rain damage but as already stated there is yield reduction following the provision of shade. Field foliar analyses done by Armitage (1993) have resulted in the following suggested optimum foliar nutrient levels: 4.05% N, 0.63% P, 3.36% K, 1.19% Ca, 0.47% Mg, 257 ppm Fe, 84 ppm Mn, 28 ppm B, and 61 ppm Zn.

Post Harvest

Cut Eryngium flower stems can be used either fresh or dried. Eryngium was listed among the top 30 flowers for drying (Armitage, 1991). Harvesting should be done when the entire flower

head including the bracts turn blue (Armitage, 1993), as soon as the whole bloom is open (Armitage, 1989b). *Eryngium planum* can produce flower stems of 3 feet long easily, and flower heads of about $\frac{3}{4}$ inch long. Cut stems of *E. planum* and *E. amethystinum* are easy to ship, keep long in the vase and dry well (Armitage, 1989a). Placing flowers in 40 °F coolers intensifies the color. Flowers persist for months in a water vase though the foliage lasts only 7 to 10 days (Whyman, 1993). The stems may be stored at 38 to 40 °F for 7 to 10 days. Though drying in the air is quite successful, more color is preserved by use of a desiccant such as silica gel (Armitage, 1993).

Marketing

In 1993 dried Eryngium were selling at \$2.75 per bunch wholesale, while the retail price was \$2 to \$4 a bunch of 10 stems. A field bunch was \$ 3.30 wholesale price (Whyman, 1993).

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