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Hort 5051

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Achyrachaena mollis Schauer

Taxonomy:

Achyrachaena mollis Schauer is an annual, flowering dicot. It is more commonly known as 'Blow Wives' or 'Soft Blow Wives'. The species is currently a member of the Asteraceae family, otherwise known as the Compositae family, and of the order Asterales. The genus *Achyrachaena* is monotypic, meaning *A. mollis* is the only species in the genus (Keil, 2012).

Taxonomic Description

Achyrachaena mollis is an herbaceous annual ranging from 2.5-40 cm in height. The stem is erect with few branches. Leaves are simple and sessile, with the lower leaves being opposite and fused



Figure 1: *Achyrachaena mollis* after bloom with showy white pappus attached to seeds. Photo by W. D. and Dolphia Bransford, Ladybird Johnson Wildflower Center Native Plant Database, University of Texas at Austin.

and the upper leaves being alternate. Blades are 1-2 cm long and can be entire or have a few small teeth. The inflorescence is yellow and quite typical of the Asteraceae family. It is comprised of 3-8 ray flowers and 6-35 disk flowers. These are arranged in a round formation atop the stem. The inflorescence itself is not considered showy.

However, the fruiting head is quite lovely. The fruiting head is comprised of ray achenes which are smooth and black. Disk achenes are ribbed, black, and scabrous. Disk achenes have oblong, shiny, white pappus scales, which are about 1 cm long (Keil, 2012). This is where *A. mollis* gets its name, as the seed is easily spread by the wind. *A. mollis* is considered to have the growth habit of a forb, a term used to describe an herbaceous flowering plant that isn't a graminoid. It is often used to describe grassland or understory plants. Seeds from *A. mollis* are edible, and were roasted and eaten by American Indian tribes in California (Goodchild, 1999). While no found literature has documented root growth or the presence of underground storage organs, through this trial, roots appear to be fibrous and no underground storage organs were detected. This makes sense, as it is an annual plant that would not have a need for long-term underground food storage. In its native habitat, *A. mollis* begins blooming as early as March, with peak bloom times in April and May (2007).

Geographic Distribution and Native Habitat

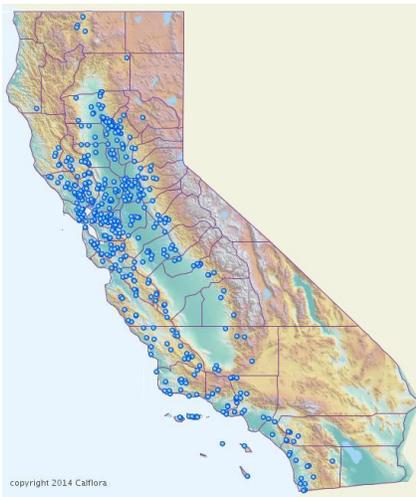


Figure 2: California distribution of *A. mollis*. Large populations have been found in the Central Coast and Central Valley regions of the state. Image from CalFlora database, http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=85

A. mollis is distributed from Southern California to southern Oregon. Elevation in areas where *A. mollis* is found generally does not exceed 900 meters. Its native habitat varies greatly. It is most commonly found in valley grasslands, foothill woodlands, oak woodlands, and wetland-riparian communities. *A. mollis* has not been introduced elsewhere as an ornamental. It has not been found outside of North America (Keil, 2012). *A. mollis* is considered a weed by some, but the species is not known to be especially bothersome. Any potential invasiveness of this species has not been thoroughly studied. Due to its high germination rates and ease of seed spread by

wind, extensive studies should be conducted before introducing this plant to anywhere outside of California or Oregon.

A. mollis is most commonly found in the Central Valley of California. The Central Valley has hot, dry summer and cool, wet, foggy winters. The rainy season ends in April, right when *A. mollis* is likely to be flowering (NWS). The rainy season for the Central Coast is very similar. Temperatures in both the Central Coast and Central Valley rarely fall below freezing, with average lows ranging from 3-7 degrees C for the winter. Summer temperatures can get up to 38 degrees C during Central Valley summers. Central Coast weather is more moderate, with temperatures generally ranging from 15-21 degrees C during summer months (NWS).

Name and Description of Cultivars on the Market

No known cultivars of *A. mollis* are on the market. *A. mollis* is commonly found in California native plant communities. They are occasionally propagated for grassland restoration projects and may be found in some native wildflower displays in California public gardens.

Propagation Methods and Findings

No official propagation methods were found for *A. mollis*. However, California State University (CSU) at Stanislaus has published limited information that growers may find helpful. Their plantings generally occur outdoors though, limiting usefulness for greenhouse growers. According to CSU, seed harvesting can occur over several weeks once the shiny white pappus on disk achenes is visible. Seeds do not have to undergo any intensive processing and can be planted with the pappus still attached. CSU recommends sowing in a nursery bed no later than December, with germination beginning as early as mid-January. According to this guide, no pre-treatment of seeds was necessary for germination (Borders, n.d.).

In this experiment, a total of 40 *A. mollis* seeds were sown on March 4, 2014 in 288 plug trays using Sunshine MVP soilless media. The trays were covered with vermiculite and wetted. Half of the sown seeds were placed in the mist house, and the other half were placed in the cooler for cold stratification. Seeds in stratification were watered twice per week. The stratification cooler was kept between 3 and 5C. Mist house conditions were as follows: mist applied in seven second durations every ten minutes, lights on for 16 hours at 150 micromols, and temperatures kept at a constant 21 degrees C day and night.

After two weeks in the cooler (March 17, 2014), some seeds had begun to germinate so they were removed from stratification and placed in the mist house. Germination counts were taken approximately once per week. Three weeks after sowing when germination was nearly complete, seedlings were removed from the mist house and placed on capillary mats in greenhouse B. Greenhouse B conditions were as follows: lights on for 16 hours at 150 micromols and constant day and night temps of 18 degrees C with a 10 degrees C DIP at sunrise for 2-3 hours. Capillary mats were fertilized with 50 ppm CaNO_3 .

On April 1, 2014 seedlings were transplanted to 804 trays for growing on. After transplant, 125 ppm N 15-5-15 was used as a constant liquid feed. When seedlings became established in the new containers, half of the germinated seedlings were placed under short day conditions. The other half were left in Greenhouse B under long day conditions. Short day growing conditions were as follows: lights on for 16 hours at 150 micromols with an automatic black shade cloth covering the bench from 4:00 PM to 8:00 AM, day temperatures of 21 degrees C and night temperatures at 18 degrees C, and fertilization at 125 ppm N 15-5-15 constant liquid feed.

On week 17, flower bud initiation occurred on 14 of the 16 plants grown in greenhouse B under long day conditions. No flower bud initiation was seen on plants in greenhouse C grown under short day conditions. However, watering was less consistent in greenhouse C, which may have impacted results.

Weeks since sow date (3/4/14)	Germination for stratified seeds	Germination for non-stratified seeds
1	0	0
2	4	0
3	31	0
4	31	0

Table 1: Table showing weekly germination counts for *A. mollis* over the course of four weeks. Germination counts did not change after 4 weeks.

Product Specifications

A. mollis would make an attractive addition to home gardeners flower beds. The unique shiny white pappus on the fruits would make this plant an interesting component of any landscape. The long bloom period will make this plant shine throughout the growing season. High germination rates and ease of care would also make this an ideal plant for growers. Based on its native climate, *A. mollis* should be a fairly drought tolerant and adaptable plant, appealing to gardeners with infamously tough growing sites. If left a taller plant, *A. mollis* could make a nice addition to potted flower arrangements. It would add height to an arrangement and the unique pappus would be very eye catching.

Anticipated Cultural Requirements

According to the Jepson Manual, *A. mollis* grows particularly well in zones 7 to 24. However, since *A. mollis* has an annual life cycle, hardiness is not of great concern. Growers will want to start *A. mollis* indoors, rather than marketing it as plant to be direct seeded in the ground. This way, Midwest growing seasons will be extended to accommodate to the life cycle time requirements of *A. mollis*. To the best of my knowledge, no research has been conducted on the heat tolerance of *A. mollis*. Based on its native climate, *A. mollis* would be expected to withstand relatively high temperatures, likely up to 40 degrees C or higher. Humidity in central California is low, but *A. mollis* has been found in wetlands. Midwest humidity would likely not pose any problems.

During the growing season for *A. mollis*, night temperatures can reach as low as 2 degrees C. Day temperatures in May can reach 30 degrees C. While no published information was found on day and night temperature requirements, native climates would suggest that *A. mollis* is extremely tolerant of a wide range of temperatures. In initial trials, seeds were germinated at a constant 21 degrees C. Half of the seedlings were grown under 18 degrees C with a morning DIP to 10 degrees C. The other half were grown at a constant day and night temperature of 21 degrees C. There were no observed differences between the two different temperature conditions. Under both conditions, seedlings appeared healthy and grew rather quickly.

The Jepson Manual suggests that *A. mollis* be grown in full or nearly full sun (Keil, 2012). Beyond this, no published information was found on light requirements for *A. mollis*. Since seeds germinated in a dark cooler, light does not seem to be a germination requirement. Seedlings grew well under greenhouse light conditions, of 16 hour days at 150 micromols. Fourteen out of sixteen plants

grown under long days developed flower buds by the end of week 17. None of the plants grown under short days had flower buds. However, watering in the short day greenhouse was slightly more sporadic and the plants grew slower in general. This could have been the cause for a lack of flower buds.

California day lengths in the months preceding *A. mollis* flowering range from 11-12 hours. Days continue to get longer during this season. This would indicate that *A. mollis* is either a long day or day neutral plant. Based on initial findings, it would be advisable to grow seedlings under 16 hour days.

Further studies should be done to confirm the photoperiodic requirement of *A. mollis*.

No nutrient deficiencies were observed under the fertilizer regiment used in this experiment (125 ppm 15-5-15 N CLF). It is possible that *A. mollis* would tolerate lower levels of fertilizer, but further experiments should be conducted to examine this. The Jepson Manual suggests that well-drained soils should be used when growing *A. mollis*; however, the plant has been found in wetlands suggesting a high level of adaptability (Keil, 2012). When growing in Sunshine mix soilless media, no disease or other soil related issues were observed. Plants were kept consistently moist.

No PGRs were trialed in this experiment. No published research was found on the use of PGRs on *A. mollis*. Based on its growth habit, growers may want to experiment with using B-Nine or a similar PGR to reduce internode elongation and produce a more compact plant. Since height is so variable with this species, PGRs can help achieve better uniformity. 288 plug trays were used successfully for germination and 804 trays were used to grow seedlings on. After 3 weeks in the 606 trays, seedlings had not become root bound. Since *A. mollis* can become a larger plant, growers will want to experiment with potting up into a larger pot. A 4" pot for final sale size is recommended for testing.

No literature was found citing any major disease issues with *A. mollis*. No disease issues were observed in the initial trial. Good cultural practices should protect *A. mollis* from disease. Sulfur pots

were used as a preventative measure. Routine insecticide applications were made to protect from common greenhouse pests, like thrips and spider mites. No insect pest damage was observed.

Production Schedule

After seeds are ripe and have been harvested, seeds should be sown in soilless media and stratified at 2-5 degrees C for two weeks. Trays should be kept consistently moist. A 288-plug tray is adequate for germination. For crops to be ready and flowering by week 20 of the growing calendar (around Mid May), seeds should be sown no later than week 10. This may vary from site to site, so growers should perform their own schedule trials to determine appropriate growing times for their facility. Seeds will begin to germinate by the end of week 12, at which point they should be placed in a mist house to complete germination.

After germination is complete, seedlings should be placed on capillary mats to continue growth. By week 14, seedlings should have their first set of true leaves. At this point, they should be transplanted into larger containers. An 804-tray should be sufficient initially. CLF should be used to maintain adequate nutrient levels (125 ppm N 15-5-15). Flower bud initiation should occur by week 17, 3 weeks after transplant, when plants are grown under 16 hour days. It is suspected that *A. mollis* will bloom approximately 3 weeks after flower buds become visible. This is based on bloom times in its native habitat. Trials should be conducted to determine time to flower under greenhouse conditions, as well as photoperiodic requirements. Photoperiodic requirements are likely day neutral or long day. Due to experimental error in this trial, results were not conclusive. In addition to producing a spring crop, growers could also consider producing an early fall crop. *A. mollis* should be able to withstand cooler night temperatures in the early fall.

Genetic Improvement Needs

A. mollis could be bred to improve its potential as a bedding plant. Gardeners often desire shorter, more compact plants. *A. mollis* tends to be a bit tall and spindly. The actual flowers of *A. mollis* are quite inconspicuous. Breeding could be done for showier flowers. The seed heads, which are considered the attractive part of the plant, should be improved to be consistently full.

Literature Cited

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