The Blazing Star

Summer 2007, Volume 8, Issue 3

Newsletter of the North American Native Plant Society

Native Plant to Know

Swamp Milkweed

Asclepias incarnata

by Natalie Helferty

Swamp milkweed (*Asclepias incarnata*), like all native milkweeds, derives its common name from the sticky, milky juice exuded by the stems, and its preference of moist environments. The juice of this plant is a latex that deters crawling insects from pollinating the flowers, which rely on flying insects for that service. An ant, for example, makes minute holes in the stem as it walks up the milkweed, thus getting its feet gummy in the sap. The sap hardens like glue in a matter of minutes when exposed to air.

On the other hand, the latex and the normally poisonous cardenolides and glycosides found in the sap have benefited the now-endangered monarch butterfly that uses the milkweed as a host plant for its larvae. One study comparing two eastern species, common milkweed (*Asclepias syriaca*) and swamp milkweed, and two western species, narrowleaf milkweed (*A. fasciculari*) and showy milkweed (*A. speciosa*), for butterfly egg-laying preference showed that swamp milkweed was preferred by female monarchs.

Swamp milkweeds often grow on riverbanks and wetland edges which become flyways for monarchs. The females lay their eggs along these routes, with the next generation of caterpillars becoming the newly emerged migrants. This amazing generational movement has

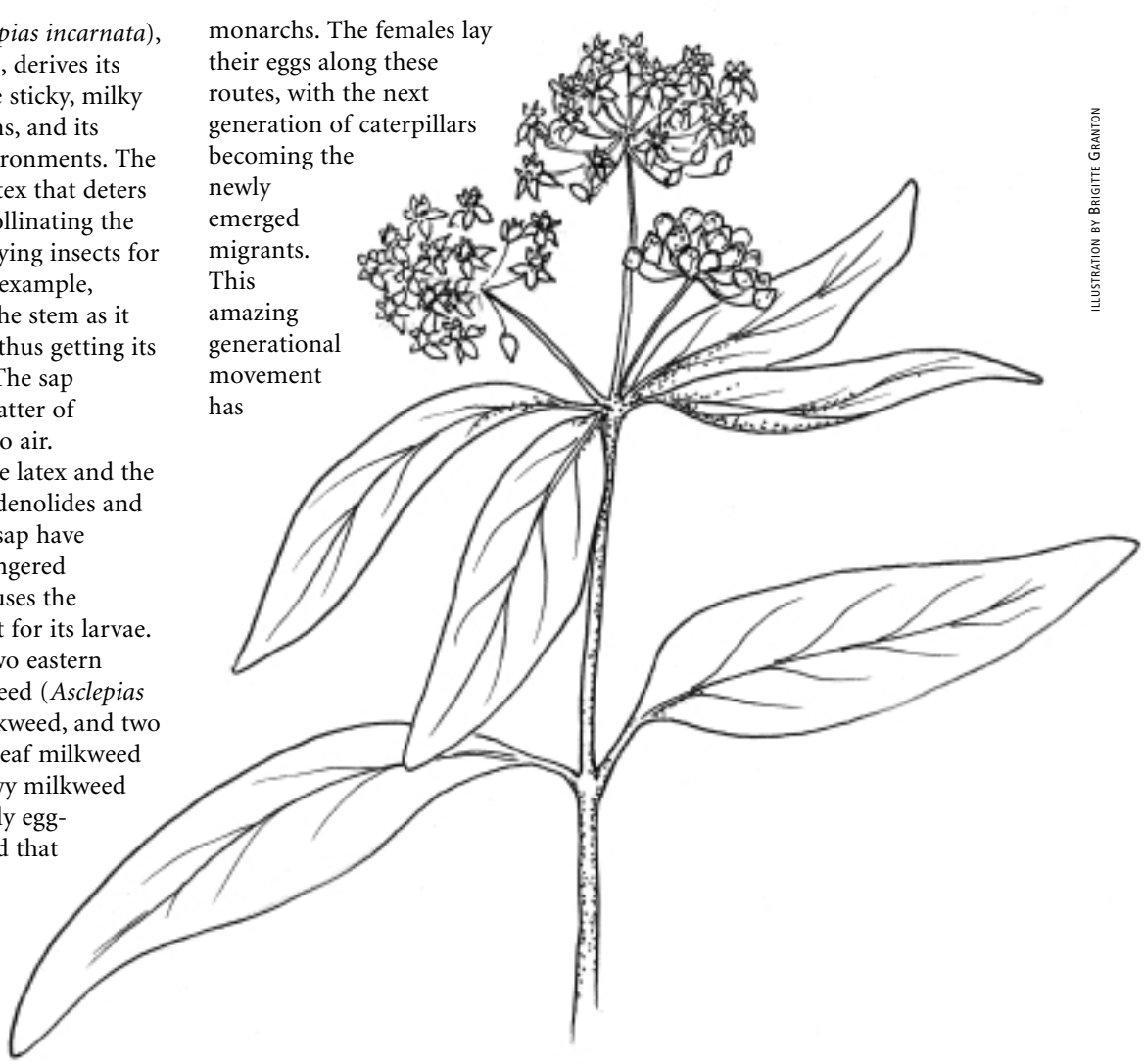

illustration by Brigitte Granton

Continued on page 12

Mangrove Restoration in Baja California

by Yoav Bashan

Mangrove forests are one of the three richest ecosystems in the world along with rainforests and coral reefs. The vast energy produced by the fallen leaves from the mangrove trees fuels the entire ecosystem.

Mangrove forests are invaluable. Many of our imported seafoods such as shrimp, clams and oysters spend the earliest, most vulnerable stage of their life protected by the mangrove thickets. The power of tidal waves to do huge damage to human habitation is seriously diminished by the presence of mangroves that act as natural breakwaters. Mangroves support a vast assortment of wildlife including birds, shellfish, fish, snakes, crocodiles, monkeys, deer, crabs, bats and honeybees. This makes them a huge ecotourism draw for birdwatchers and nature lovers.

Worldwide, mangrove forests are home to 70 tree species, mostly unrelated. The unifying characteristic is that all flourish in tidal zones, unaffected by daily submersion in seawater. All mangroves have developed mechanisms to eliminate the toxic effects of salt that would kill a terrestrial tree. Their range extends around the Earth within a 30- degree radius of the Equator, mostly in poor countries that cannot afford to protect them.

In Baja California, Mexico, at the northern edge of mangrove distribution, we have three tree species: red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*) and black mangrove (*Avicennia germinans*), all named for the relative colour of their trunk. Although mangrove trees are capable of growing as large timber trees in places where fresh water mingles with salt water, in Baja California they grow to a maximum of six metres (20 feet) because fresh water is almost never available.

Despite their virtues, mangroves are under siege worldwide. The common "bad guys" are aquaculture, mainly shrimp farming, and rice agriculture; both see the mangrove forests as the last frontier of expansion. They are also threatened by cheap housing projects in urban areas, salt pans and roads and port facilities. In Baja California, the culprit is tourist development. By some conservative estimates most of the mangrove world acreage will soon be gone if something drastic is not done to stop the destruction.

Photo courtesy Yoav Bashan

Degraded Baja California mangroves

Recently mangroves were declared protected by the Mexican government. But the government has not allocated sufficient funds for conservation and restoration. Nor is the private sector much interested in investing in unprofitable enterprises like mangrove restoration. And, despite the law, developers still destroy mangroves and just pay the fine.

In the early '90s the mangrove forests at Balandra Lagoon in Baja California Sur, were illegally clear-cut, leaving bare areas with tree stumps. Natural re-vegetation of mangroves in arid climates is very slow, if not aided by artificial reforestation using plants grown in greenhouses. In 1995, the area was mostly still bare, with very few naturally grown small mangrove shrubs combined with large expanses of the short halophytic shrub *Salicornia bigelovii*, which is associated with mangroves. Propagules (reproducing plant parts that are equivalent to seeds in other plants) produced by the intact nearby mangrove might have had the potential to colonize these bare areas. Unfortunately, they were probably washed away by strong tidal currents. In this region, tides may fluctuate by one or two metres (three to six feet), and achieve considerable velocity in the constricted channels in and around the mangrove.

Conventional reforestation of the entire destroyed area was impractical

Continued on page 8

Continued from page 7

given the lack of resources and government interest. An innovative approach was needed. We decided to grow black mangroves in a conventional nursery. The young trees would be replanted in a special manner to densely cover shallow, secondary feeding channels connecting this section of the destroyed mangrove to the central lagoon section of the intact mangrove ecosystem. This secondary channel is very shallow at 20-30 centimetres (eight to 12 inches) deep and up to 10 metres (33 feet) wide. It drains a very large section of the forest containing two major deforested areas. The assumption was that when these trees grew, their lower branches would touch the water at high tide and block some floating propagules from washing into the open sea. Then the propagules would settle into the mud at low tide. Propagules of black mangroves germinate and establish quickly once they are settled. It was also assumed that the more dense the forest (consisting of the artificially planted plants and the retained ones), the more propagules would be retained. And, the artificial reforestation would not interfere with the tidal cycle, which is essential for a healthy mangrove.

In September 1994, a mangrove nursery was established, using sand culture pots irrigated with seawater and planted with black mangroves. Some of the plants were inoculated with the nitrogen-fixing cyanobacteria *Microcoleus* sp., a bacteria that will likely promote plant growth and assist in the establishment and growth of the seedlings in the area. After four months, 500 seedlings were transplanted to the secondary feeding channel in one of the deforested areas. Apart from annual weeding of competing salicornia shrubs (salicornia is a salty lettuce sold in supermarkets in Arizona), no special treatment was given to the area. To protect the reforested area from visitors from the nearby beach who used the mangroves as a toilet and garbage dump, a natural, shallow trench on the fringe of the mangroves was significantly deepened and filled with soft, silty mud. Signs were posted to warn against unauthorized entrance to the reforested area. After the plants were planted, their development was maintained and monitored for three years. Then rangers from the Mexican Ministry of Ecology and the environmental protection agency of Mexico (PROFEPA) took over protection.

Photo courtesy Yoav Bashan

Baja California mangroves after

In 2006, an inspection of the area showed a completely restored mangrove, including previously deforested areas drained by the same secondary feeding channel but far from the reforested area. Today, there is no way to distinguish between the natural primary forest and the area of secondary growth, except for the size of the trees. The area is like a dense jungle. It is healthy and does not need maintenance.

A surprising outcome of this endeavour was the enthusiasm with which the local population received it. Locals appreciate the "new look" of their beautiful mangrove forest in the middle of the dry desert. Last year, when a new developer wanted to convert Balandra lagoon into another golf course/resort/condo development, the public outcry was so loud that the development was put on hold.

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Mangrove Webpages:

Steps that individuals can take to conserve coastal plain plants in their natural habitats:

1) Conservation of arid mangrove ecosystems in Baja California Sur, Mexico. http://www.bashanfoundation.org/mangrove/imang.html

2) Restoration of hurricane-damaged mangroves at Punta del Mogote, Baja California Sur, Mexico. http://www.bashanfoundation.org/conservation2.html

3) Restoration of arid-zone mangroves in Balandra Lagoon in Baja California Sur, Mexico. http://www.bashanfoundation.org/balandra/balandra.html