NATIVE INSECT VERSUS NATIVE WEED

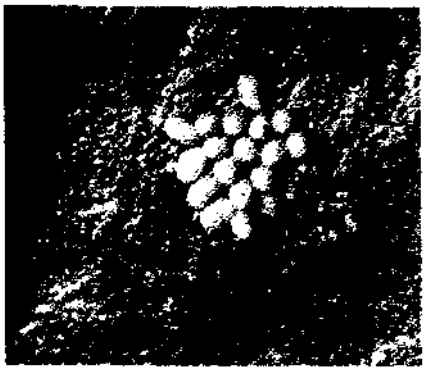
John R. Cassani
Lee County Hyacinth Control District
Post Office Box 06005
Fort Myers, Florida 33906

The classical approach to applied biological control of weeds has been the exploration for and introduction of exotic organisms for the control of non-native weeds. Several native plants are considered weeds usually resulting from human manipulation (e.g. cultural eutrophication). A good example of a native insect interacting with native weed and occasionally controlling it would be the so-called water-lily leaf beetle (*Galerucella nymphaeae (L.)*) and the primary host plant spatterdock (*Nuphar* spp.).

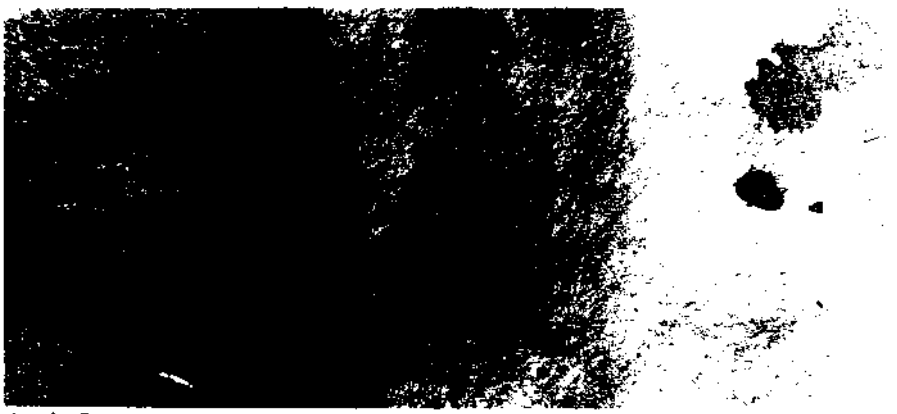
G. nymphaeae belongs to the beetle family Chrysomelidae also known as leaf beetles, many of which are pests of economically important plants. *G. nymphaeae* has a widespread distribution in North America, Northern Europe and has been observed on *Nuphar* in several areas of Florida.

A necessary requirement of any insect used as a biological control agent is that it must have a narrow host range or will not damage desirable species. *G. numphaeae* has been reported from other aquatic plants namely *Nymphaea* spp., knotweed (*Polygonum*), sweet gale (*Myrica*) and water chestnut (*Trapa natans*) but it seems to prefer *Nuphar*.

In Florida, most of the observations to my knowledge of *G. nymphaeae* on *Nuphar* have been in the northern and central areas of the state, usually in lakes where *Nuphar* is very abundant. *G. nymphaeae* has been observed to reduce the density of *Nuphar* in Lake Gibson in Polk County by as much as 50-60 percent (Mr. Tom Drda, Florida Game and Fresh Water Fish Commission, personal communication). Lakes Pierce and Marion also in Polk County have had populations of *G. nymphaeae* that have done considerable damage to *Nuphar* at one time or another (Mr. Paul Myers, personal communication). During April, 1980, I observed a population of *G. nymphaeae* on *Nuphar* in Lake Eustis that caught my eye from a considerable distance. I could not find any specimens on plants in the area other than *Nuphar*. Mr. David Tarver of the Florida Depart-



Eggs of *Galerucella nymphaeae*.



Adult *Galerucella nymphaeae* on *Nuphar* leaf.

I'VOD® The NATURAL INVERTING OIL

No Diesel Oil Required
Most Economical per surface-acre-sprayed
PROVEN BY THE PROS ALL OVER FLORIDA
such as Citrus County Weed Control, Collier County,
Lee County and The South Florida
Water Mgt. Dist. etc. etc.

General use: 1.5-2 ga/surface acre

IF YOU INVERT YOU NEED I'VOD

call or write for details

JLB International Chemical Inc.
PO Box 6006
Vero Beach, Fla. 32960
305-562-0555

ment of Natural Resources informed me that a population of *G. nymphaeae* had established on *Nuphar* at Lake Miccosukee in Jefferson County and despite an abundance of white water lily *Nymphaea odorata*, *G. nymphaeae* was observed only on the *Nuphar*. I have never observed *G. nymphaeae* in the southern region of the state and its distribution in Florida may be limited by climatic conditions or the effects of localized parasites or predators. I have observed small sparrow-like birds that effectively prey on insects on emersed and floating *Nuphar* leaves. Studies have shown that certain birds associate ragged leaves with the presence of insect food and this may be a factor that limits the distribution or abundance of *G. nymphaeae* in certain areas. Fish have also been reported to feed ravenously on the adults and larvae when they can be reached.

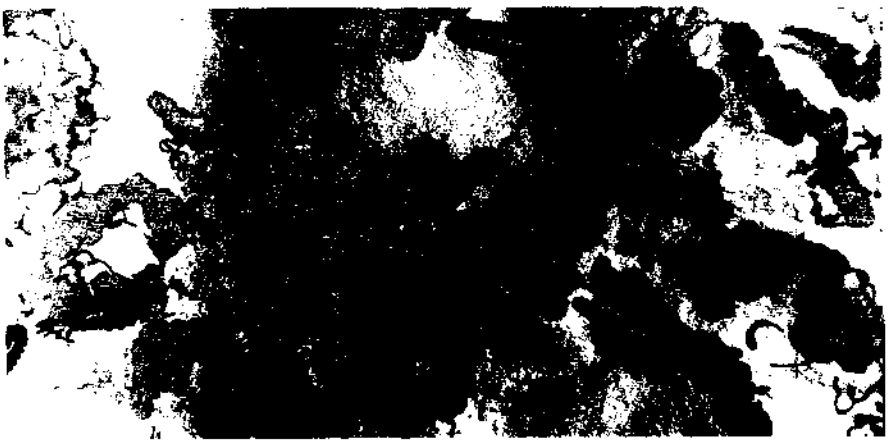
The larvae and adults of *G. nymphaeae* damage *Nuphar* by feeding on the leaf epidermis, usually the upper side, the stem and the flower. In extreme cases the entire leaf will be eaten away or damaged to the extent that fungal pathogens deteriorate the remaining portion. All of the life stages (egg, larva, pupa and adult) can be found on the plant at one time. The adult female may lay as many as 115 eggs in masses of 6 to 12 over a period of 10 to 19 days. The larvae are black or dark brown above and yellow beneath and reach about 8mm at maturity. The length of the adult is about 6mm and is dark brown above with yellow margins. The pronotum or dorsal side of the thorax often has 3 black spots. It is thought to have 2 or 3 generations per year although relatively little is known of its seasonal occurrence in Florida. Adults are thought to winter in dead stems and under the bark of trees.

More research is needed on *G. nymphaeae* before it can be considered a safe and effective biological control agent for *Nuphar*. Details of its distribution in Florida, host range, seasonal population dynamics and laboratory rearing techniques are a few of the considerations that will have to be made. Also of importance are the natural factors that suppress populations of *G. nymphaeae* in certain areas and not in others.

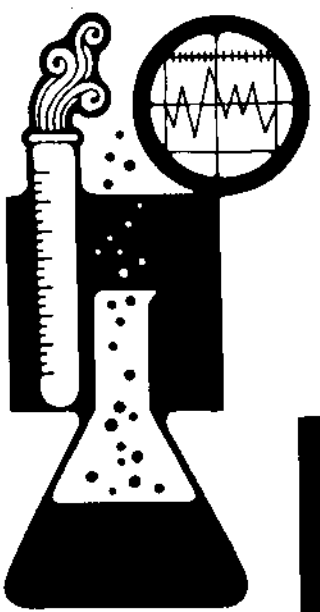
Several of these parameters are being investigated at the Lee County Hyacinth Control District in Fort Myers. The beetle is being investigated in caged and natural outdoor environments in an effort to determine some of the factors affecting population fluctuations. Methods for maintaining laboratory colonies are also under investigation and preliminary results indicate that it can be maintained for relatively long periods on *Nuphar* alone at various population levels. We have kept a colony in the laboratory for a period of at least 15 months.

In general, the beetle has several good aspects when considering it as a biological control agent. First of all it is a native insect which appears to be limited by certain controlling factors although not yet well understood. In other words, it is not likely to spread to every area having *Nuphar*. Secondly it is capable in certain situations of exerting significant damage to *Nuphar* at high densities but preliminary observations seem to indicate that it affects *Nuphar* populations more by reducing the density of plants rather than eliminating them. This is of course a desirable way of managing native aquatic plant species. Also, most of the reports I have heard indicate that the beetle seems to occur more often where *Nuphar* occupies large areas and is extremely dense. In such situations the high density and large area occupied by the plant can inhibit recreational activities. In canals *Nuphar* has been known to curtail even fast-flowing water.

On the other hand, *Nuphar* in certain situations is a valuable plant as it relates to fish habitat and the natural productivity of many freshwater areas. These considerations should be given careful attention before any attempt is made to manipulate *G. nymphaeae* on any scale. △



Mature larvae of *Galerucella nymphaeae* feeding on *Nuphar* leaf.



AT YOUR SERVICE . . .
THE PROFESSIONAL AQUATIC WEED CONTROL SPECIALISTS — DISTRIBUTORS
PENNWALT, CHEVRON, 3M, NALCO, A & V, JOHN BEAN & OTHERS

COVERING FLORIDA FROM —

TAMPA
5414 N. 56th Street
P.O. Box 1096
Tampa, FL 33601
(813) 626-2111

MIAMI
2490 N.W. 41st Street
P.O. Box 420981 Atlapattah Station
Miami, FL 33142
(305) 635-0321

JACKSONVILLE
1845 Wright Avenue
Jacksonville, FL 33207
(904) 398-3759

TOLL FREE WATTS IN FLORIDA: 1-800-282-9115

SMCP **Southern Mill Creek PRODUCTS COMPANY, INC.**
TAMPA • MIAMI • ATLANTA