Q&A

12Q3: Please tell me how to control water weed growing in raw water transmission channel and what measures we can take. And I would like to know what kind of pesticide is effective for removal of Duck lettuce. (Mr. P.O from Thailand)

A: Species

Aquatic plants are divided into two groups; floating plants and submerged plants. The typical plants you likely observe in water transmission channel are Water Hyacinth (Eichhornia crassipes) as floating plant and Brazilian Waterweed (Egeria densa), Florida Waterweed (Elodea nuttalli) as submerged plants.

Problems

I have never heard that Duck lettuce* causes a problem in water treatment facility or treatment system. The status of Duck lettuce is far different in several countries, for example, it is an endangered species in Japan, and however, it is decided as an invading harmful plant in United States of America. It could be an obstacle of water flow in channel and may decrease flow rate of water or change of direction of flow when it glows gregariously and make a large clump under good living condition at the intake and channel. If the dead clump flows down and is entangled with bar-screen at the intake, it might make a clog and disturb the achievement of design intake flow. The plants which are known as causation of such bar-screen clogging are Water Hyacinth, Brazilian Waterweed and Florida Waterweed.

Countermeasures

Barrier is effective to prevent the floating plant from coming into the cannel. You can use bamboo for making barrier which is placed in front of intake. If you use river water directly, it will not cause serious problem because the plant will flow down easily. If you take water from channel, you need to remove the plants from the barrier by hand or by using net. The submerged plant tangled with bar-screen is removed by drag rake with claws manually, or by dust scraper of bar screen mechanically.

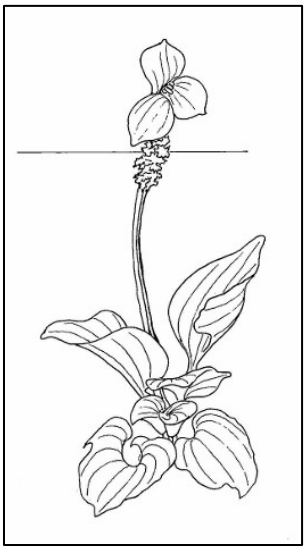
There are many procedures to remove water plant glowing in a channel as follows.

1) Staff enters the water and takes off the plant by hand.
2) You can make a small tool by wire to pick and catch the plant.
3) You can use a metal-made drag rake.
4) You can set rope over the cannel and bind the heavy iron chain at the middle of the rope, and then you drag the rope by both sides like a seine. Consequently, the submerged plants will be dredged and removed by the chain.

It is strongly recommended that you must not use any pesticide and chemicals. There are two

types of algae; attached algae and floating algae (plankton algae), in the sedimentation tank. In some cases, small animals live in the colony of attached algae. When the colony of attached algae grows largely, it detaches from wall or becomes a core of mud ball and causes filter clogging. Odor algae such as Anabaena emit odor substances into water. And these substances can go through the filter and get to the tap water. It gives people using this water an unpleasant feeling.

* **Duck lettuce (Ottelia alismoides)**



General information

It is annual water plant and it has similar leaf to Plantain (see the picture right). Its leaf has long petiole or leaf stalk and green-brown or purple-brown color. The shape of leaf is curly and oval or wide oval with irregular teeth and tusks at edge. The length of leaf varies widely from 10cm to 1m by living condition. It flowers only one day. The flower is white, pink or light purple bisexual flower, and the size of flower is from 2 to 3cm in diameter. It flowers on the water, individually in bract sheath in long stalk. It has obovate three petals, long oval three sepals and six stamens. After seed ripen, it will fall down in scattering on the water, and floating for a while until reaching to next place to start living.

Distribution

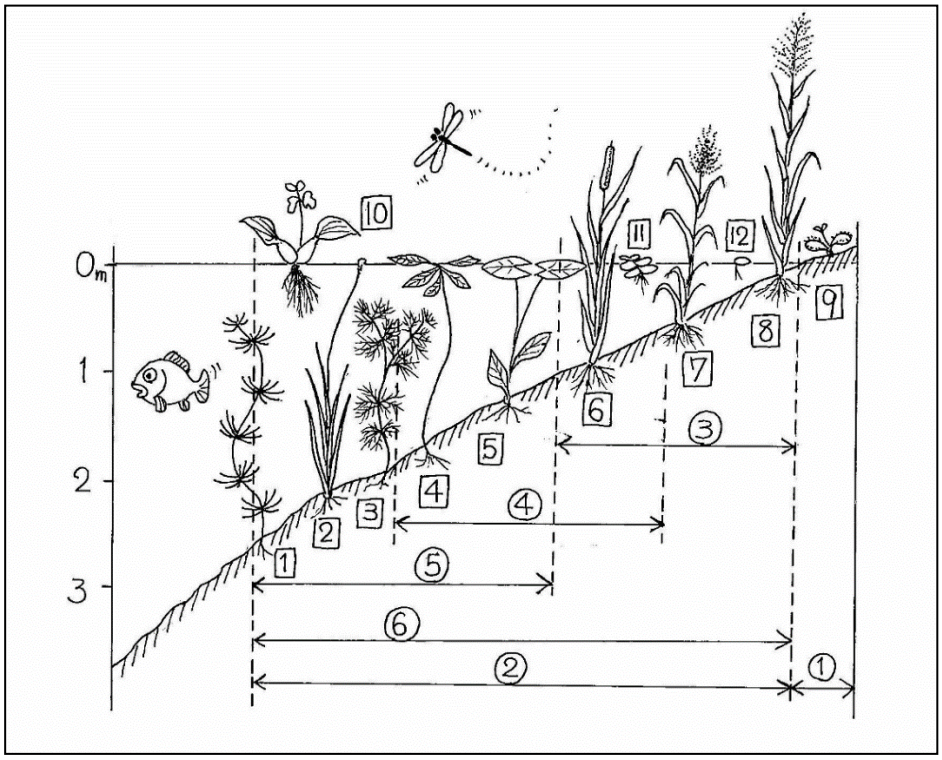
It glows naturally in southeast Asia, north Africa, India and Australia. In Japan, it is found at paddy field, waterway, pond and wetland below Honshu and some islands such as Amami and Okinawa.

Use

Duck lettuce is food in countries in southeast Asia and Okinawa island in Japan. Young leaves are soft and taste ordinary so it is edible raw after washing thoroughly. It is also good garnish of meat dishes. Please allow me to introduce some more information about edible water plants. Spirogyra is a kind of algae which is eaten in peculiar area as filling of omelet, soup as well as raw diet. Swamp cabbage is famous in Chinese dishes. I love Pak-bung faidaeng (Stir-fried Morning Glory with Chili); this is a Thai dish made with it. Duck lettuce is not only known as food but also herb medicine. It is said to be effective for cough fever and diuretic. Water plant can take in nitrogen and phosphorous in water easily and grow up quickly. As a result, it can help water purification.

Vertical distribution of water plants

The depth of water generally increases from lakefront to offshore. The vegetation of water plants varies with the depth of water from marsh plant zone at the lakeside to water plant zone at the lakeshore. The kind of water plant differs according to habitat and forms the vertical distribution. For example; the emerged plant zone is located shallower than 1m water depth, floating- leaved plant zone is up to 5m, and submerged plant zone is up to 20m (see the figure below). Horizontally, the belt-like distribution of plants is observed from the lakefront to the location of 20m water depth that is a vegetative limit of photosynthesis plants. The limit of vegetation is the limit of photic zone. Photic zone is equal to trophorgenic zone, and out of photic zone is tropholytic zone.



Vertical distribution of Water plant

① marsh plant zone (hygrophyte) ② water plant zone (hydrophyte) ③ emerged plant zone ④ floating- leaved plant zone ⑤ submerged plant zone ⑥ free-floating aquatic plant zone

[1] Axle weed (Chara braunii) [2] Eelgrass, tapegrass (Vallisneria natans) [3] Common horn weed, Coon tail (Ceratophyllum demersum) [4] Jesuit's nut, Water caltrops (Trapa japonica) [5] Nymphaea (Nymphaea tetragona) [6] Lesser bulrush, Narrou-leaved cattail (Typha angustifolia) [7] Canadian rice, Water oat (Zizania latifolia) [8] Bog reed (Phragmites communis) [9] Sundeu (Drosera rorundifolia) [10] Water hyacinth (Eichhornia crassipes) [11] Floating moss (Salvinia natans) [12] Big duckweed (Spirodela polyrhiza)

* Illustration is quoted from "Japanese Water Plant Illustrated Reference Book", (Dr. Otaki and Dr. Ishido, Hokurikukan, 1980). And writer modified it.

(Answerer: Mr.SASKI Shinicchi, Yokohama Waterworks Bureau, 2010)