AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly e Newsletter

Volume 2 – Issue 8
Online ISSN: 2582-368X
www.agriallis.com

INSECT AS POLLUTION INDICATORS OF ENVIRONMENT

Article Id: AL202085

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Pollution is the definition of contaminations like (solid, liquid, gas, and even light) into their natural environment that causes an adverse change in the environment. These effects are like to be the degradation of natural resources and nature. Many of the ecosystems the insects are responsible for some process in the ecosystem, and the entire communities will be a loss. The insect responses to a strong understanding of their human activity are necessary. Sometimes human also one of the disturbances on ecosystems. Indicator species means which the species are present, absence (or) abundance reflects a specific environmental condition, habitat (or) community. It may provide information on the overall health and ecosystem. When the species is present, it indicates the presence of certain environmental parameters. The species can provide forecasting of environmental changes. They can be used to assess the health of an environment (or) ecosystem- they are often termed as “Bio-indicators”.

Aquatic insects as Water Pollution Indicators

Insects that live completely (or) carry a major part of their life cycle in water can tell directly about water pollution. Several insects live in freshwaters such as Larvae of Mosquitoes, Odonates, and Neuropterans. The absence of these larvae indicates the presence of Arsenic and Lead concentrations in water.

Dragonflies and Damselflies:

Dragonflies and damselflies are the important predatory group in the quality of biological water monitoring and otherwise are used as particular species also sensitive to pollution.

Volume 2 – Issue 8
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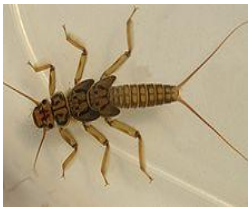
Mayfly

Mayfly larvae are one of the most important for their sensitivity to oxygen depletion in running water and also used as an indicator of water pollution. The larval period of the mayfly life cycle is more than adults. The larvae are sensitive to dissolved oxygen levels in the water.

Caddisflies

These group of insects Caddisflies (Trichoptera), the larvae occurs in freshwater. Only for several species are sensitive to water pollution, and they are also used as bioindicators for the purity of water.

Stone flies



Stonefly (Plecoptera) larvae can live only in the clear water, and these stoneflies prefer well-oxygenated water to survive.

Bugs

Bugs (Hemiptera) of many families like Corixidae, Nepidae, Notonectidae, Belestomatidae, and Gerridae are acting as bio-indicator to determine the purity of water.

Polluted Water Indicators

Many aquatic organisms formation of tolerance to metals has been detailed by the Metallothioneins (MT). MTs means it is a measurement of metal tolerance; this measurement can provide clues about the tolerance in this organism and the possible toxic agents responsible for environmental stress. For the example of genus Halobates (Gerridae) one of the most suitable for bio-indication of Cadmium & Mercury.

Volume 2 – Issue 8
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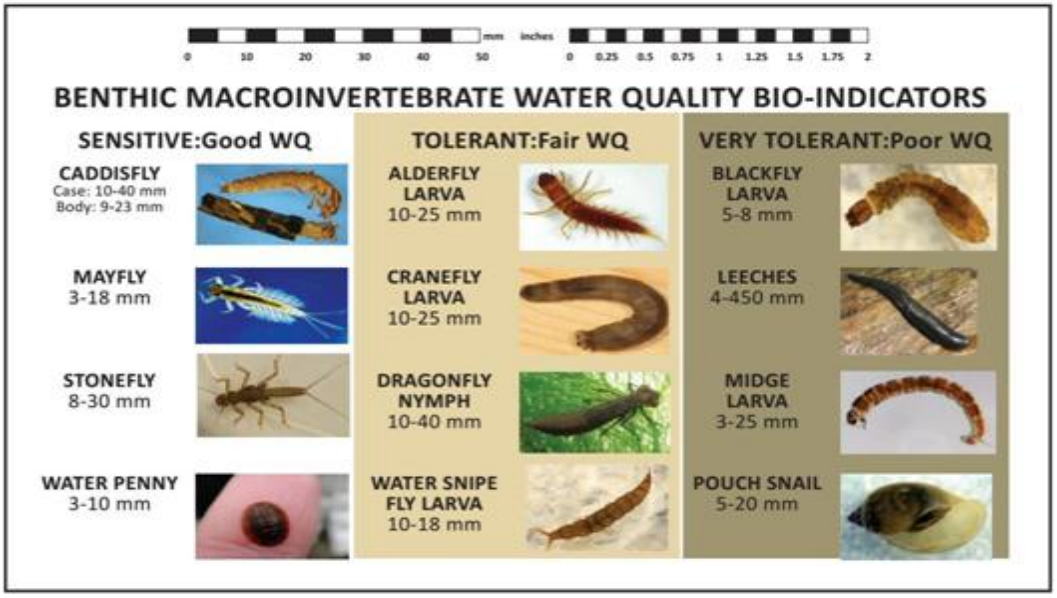

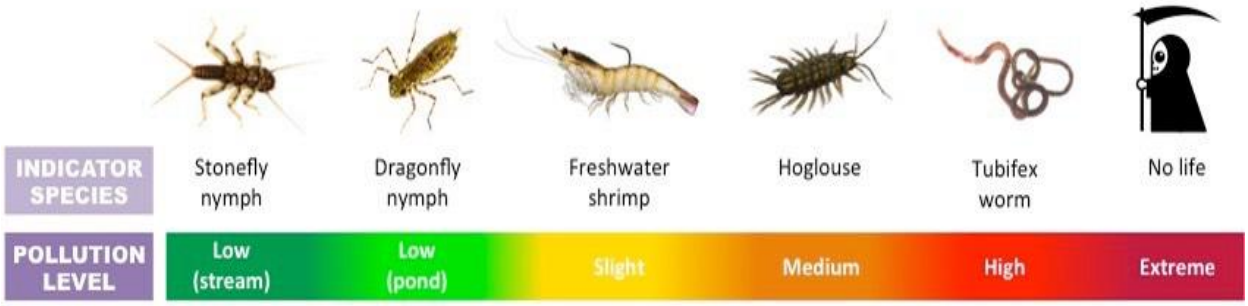

Insects as Terrestrial Pollution indicator

Terrestrial insects are good bio-indicators, and it is used for several types of environmental change. Traditionally soil invertebrates are used to indicate soil fertility and pollutant level. Occurrence of excess acidic (or) alkaline content, fertilizers (or) industrial waste kills larvae, grubs, nymphs and adults of these insects. The insects are not able to lay their eggs on polluted land areas. Several insect groups can be used as terrestrial environment bio-indicator, which are as follows

Coleoptera

Family Carabidae insects are the most important predators in the order Coleoptera. They involved in the monitoring of pollutant from oil, sulfur, herbicides, Co_2, insecticides and radioactive phosphorus.

Volume 2 – Issue 8
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Collembola

Apterygote insects that are influencing the soil fertility and stimulation of microbial activity. The inhibition of diseases causing plant-like such as bacteria and fungi. These insects are sensitive to changes in the soil, and reduction in the number of insects to the pollution by heavy metals, usage of pesticides in agricultural soils and soil water acidification by organic pollutants and wastes.

Ants

Ants are used as quality bioindicators of soil and are very sensitive to human impact. Some ant groups have the potential as biological indicators of soil conditions, crop management and assessment systems for plantations in agro-ecosystem.

Insects as Light Pollution indicators

Excess exposure to light disturbs the developmental cycle of many insects. Their daily activity regime (or) biological clock is negatively affected (Eg)- Migration of Monarch butterflies disturbs due to heavy flashlights at night time. Insect species affected by Sound Pollution

- Sounds are an important part of social insects life history. Generally, males are produced advertisement calls to attract females (or) to drive out competitive males out of their territory
- Negative effect of vehicular horns, the noise of moving vehicles and other sources suppress the advertisement call of male insects

Insects as Industrial Pollution indicators

- Pollutes the entire ecosystem and Unprocessed industrial output, when enters ecosystem leads to a phenomenon called “Biomagnification.”
- Biomagnification- Accumulation of insecticides (or) pesticides in an increased amount from one trophic level to other trophic levels

Volume 2 – Issue 8
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- Famous example- Industrial revolution (or) Industrial melanism- Peppered moth/ British moth- *Biston betularia*

Mainly the Bees are only the most important pollinators and as well as bioindicators. Several researches were aimed mainly on the hymenopteran insects. The strength of the pollinators and its size of the populations are generally considered the most important features for the reproduction of plants, especially to the agricultural crops. In Recent news mass dying out of honeybee in the United States of America because of fertilizers has brought honeybees to the list of endangered species.

Lepidoptera- Moths & Butterflies The members of this group can be used as pollution indicators via., heavy metals & carbon dioxide in localities near the industrial and within urban areas. Pupae of various species of Geometridae, Noctuidae and Eriocraniidae, are accountable for studying manifestation and concerns of Cu, Fe, Nickel, Cadmium, Sulfuric acid ions and other substances in fertilizers

Other bioindicator insect groups

Termites- Increases soil infiltration capacity, which leads to water retention & soil productivity. In agricultural, pasture and reforestation areas they are not always perceived because its nests are underground and their presence is only noticed by the damage they cause to the plants

Aphids also one of the pollutant indicators. When the hosts are exposed in the aphids, increases the density of the highest population to the higher carbon dioxide in their environment.

Conclusion

According to these changes in the environmental conditions, only several species are responses than the others. Diversity of insect population was more in agricultural and forest ecosystem and better ecology stability in nature. Biodiversity is used to reduces the usage of inorganic compounds in agricultural and horticultural areas. Honey bees are used for

Volume 2 – Issue 8
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monitoring the metal trace, pesticide and herbicidal effects in the environmental contamination and Essential for environmental monitoring. “They might be small, but they are the dominant species on the planet in terms of numbers. What happens to them affects whole ecosystems”.

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