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Economic Importance of Insects Weeds Killers

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Weeds are unwanted plants and have been a menace in many countries by spreading to large areas of fertile land. Quite many insects feed upon the weeds, just as they do on cultivated plants. A successful weed killer insect (i) should not itself be a pest of cultivated plants and should not even at a later date turn to attack the useful crops; (ii) should be effective in damaging and controlling the weed; (iii) should preferably be a borer or internal feeder of the weed; and (iv) should be able to multiply in good numbers without being affected by parasitoids and predators. In many cases, these insects have contributed much towards eradication of the weeds or at least keeping them under check. Opuntia spp. (Prickly Pear)

Various species of Opuntia, which has its origin in the western hemisphere, have been transported for the purpose of human food (fruits), cattle food (pads) and food for the dye-producing insects. In Australia, it became an extremely aggressive weed, in festering some 25 million ha of cultivable land. A pyralid moth, Cactoblastis cactorum obtained from Argentina and introduced in Australia in 1925, was able to salvage huge areas of land from cactus by 1930. The most remarkable feature of this success story is that only 2750 Cactoblastis larvae were brought to Australia, of which only 1070 became adults. From these, however, more than 1,00,000 eggs were produced, and in February- March of 1926 more than 2.2 million eggs were released in the field. Additional releases and redistribution of almost 400 million field-produced eggs until the end of 1929, ensured the project's success. The control was so drastic that the entomologists got concerned about the very survival of these insects themselves due to the shortage of food, i.e. Pontiac. The cochineal (scarlet dye-producing) insect, Dactylopius colonics, a coccid or scale insect (Homoptera), has been successful in the prickly pear control in Kenya and D. opuntiae in the USA (California). In India, O. dillenii was a noxious weed and it has been practically eradicated by the cochineal insect, D. tomentosus. The insect is a native of Mexico and was introduced into India via Sri Lanka in about 1925. Within the next five or six years, the weed was almost exterminated.

Lantana camara

Lantana, a native of Central America, is extensively used throughout the world as an ornamental shrub. But in many countries, it has escaped civilization and encroached upon vast areas of cultivable land. India shares this weed problem along with Hawaii, Fiji, and Australia. In India, two insects have been tried a lace bug, Teleonemia scrupulous, and a seed fly, Ophiomyia lantana (both Central American in origin). In Uganda, Lantana has been controlled by T. scrupulosa. Hypericum perforatum (St. John's Wort or Klamath). This weed poses serious problems in the USA, Australia, Canada, New Zealand and Chile destroying thousands of hectares of land. Various species of the leaf-

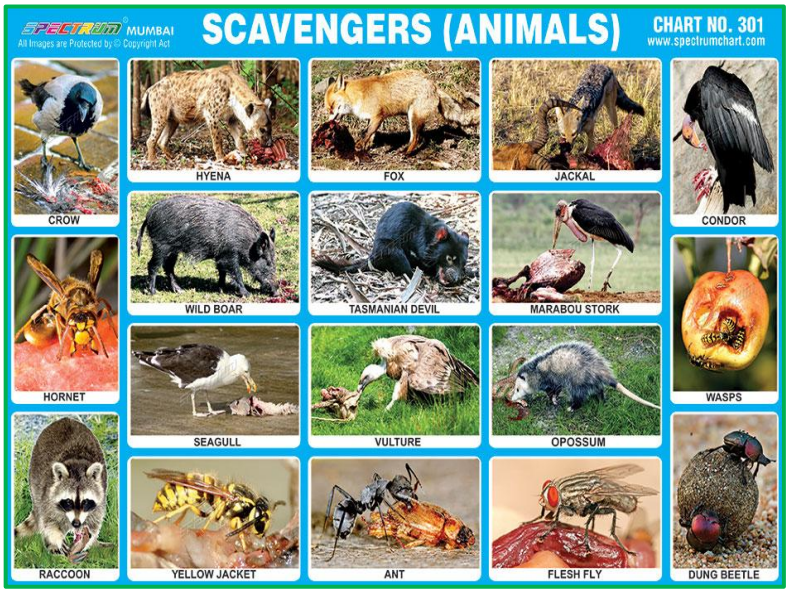
feeding beetle, Chrysolina have controlled this weed successfully. Senecio jacobaeae (Tansy Ragwort). This is another weed that has been causing a great damage to pastures in New Zealand, Australia, USA and Canada. The weed has been controlled to great extent by the moth, Tyria jacobaeae and the seed fly, Pegohylemyia seneciella.

Soil Builders

Many insects during one or more of their life stages live inside the soil and some in the tunnels made by them. Members of almost all the orders of the insects have been observed in the soil and most important of these are the ants, beetles, bees, larvae of flies, crickets, cutworms, collembolan and pupae of moths. They usually remain confined to the top 15 cm of soil, some of the insects like ants, termites, bees, beetles and crickets are also known to build nests. By their very habit, majority of the soil dwelling insects are ignored by humans. Only those that adversely affect our well-being, for example, termites, wireworms and cutworms, attract our attention. However, it seems probable that the damage done by such pests is greatly outweighed by the benefits that soil- dwelling insects confer.

During the process of making tunnels and burrowing into the soil, soil particles get disintegrated; subsoil is brought to the surface resulting in turning of the soil. Thus the burrowing activity facilitates aeration, drainage and turnover of the soil. Many species carry animal and plant material underground for nesting, feeding and/or reproduction, which has been compared to ploughing in a cover crop. The condition of the soil is improved by producing humus as a result of consuming organic matter and passing it out as waste. Soil is also enriched by the addition of insect saliva and decomposition of exuviae and dead bodies of the insects. Considering their vast numbers, the insects as a whole must equal or exceed the earthworms in building and improving the soil.

Scavengers



Many insects feed on dead and decaying animal and plant matter, and thus accelerate the return of elements to food chains. Since these insects help to remove from the earth's surface the dead and decaying bodies, which would otherwise be a health hazard, they are referred to as scavengers. It is a common sight to see insects collecting over bodies of dead road-side animals and eating them. Such road-side deaths are much fewer than those occurring in inaccessible places like forests, deserts and mountains. If the carcasses are not quickly eaten away by the insects, the environment of the entire Earth will get filled with stench of rotting making it impossible for

humans to live. Linnaeus did not exaggerate when he had said that a dead horse can be devoured faster by hungry flies than a hungry lion.

The insects, therefore, are the most efficient scavengers of nature and offer this service free to humans. In addition to cleaning filth from human habitations these insects help to convert these bodies into simpler substances before returning them back to soil where they become easily available as food for growing plants. There are two groups of insects (Coleopters and Diptera), which perform the major duties of scavengers In addition, the termites (Isoptera) feed upon dead wood and ants (Hymenoptera) live upon dead animal or decaying vegetable matter.

Coleoptera

This group contains: () Dung or chafer beetles (Scarabaeidae). The larvae and adults of these beetles feed on dung or decaying vegetable matter. The larvae of many other species are generally found among wood, dead leaves and other plant refuse. (ii) Rove beetles (Staphylinidae). The larvae and adults abound wherever there is decaying animal and plant matter, including dung on the soil. (iii) Skin beetles (Dermestidae). Most of the members of this family, both in their larval and adult stages, feed on dead animal matter like skin, hides, wool and fur. (iv) Carrion beetles (Silphidae). Almost all the species of this family feed upon bodies of dead animals and a few on vegetable refuse. (v) Darkling beetles (Tenebrionidae). Some of these beetles live in dung and in dead animal matter and under bark.

The Australian dung beetle project has successfully exploited the use of dung beetles for dung disposal and preventing the use of the decaying material by pest insects, e.g. flies. In Australia, there are an estimated 22 million cattle and 162 million sheep that collectively produce 54 million tonnes of dung each year. The cattle dung especially provides food and shelter for many insects, including the larvae of two fly pests, the introduced buffalo fly (Haematobia irritans exigua) in northern Australia and the native bush fly (Musca vetustissima) in south-eastern and south-western areas of the country. In 1967, various species of tropical South African dung beetles were released in northern Australia. The beetles rapidly multiplied and spread over wide distances, while simultaneously achieving complete or partial disposal of dung for much of the year. Over the next 15 years, about 50 additional species of dung beetles, plus a few species of histerid beetles that prey on fly eggs, larvae, and puparia were imported, not only from southern Africa but also from southern Europe and Asia. Of the 50-odd species released, 25 dung beetles and 3 histerids have established breeding populations in the field. This project has resulted in saving farmers the cost of harrowing, accelerating the release of nutrients into the soil, and reducing the availability of fly breeding sites.

Diptera

In case of dipteran insects, it is only the larvae which feed upon decaying matter and serve as scavengers. This group includes: (i) Fungus gnats (Mycetophilidae). The larvae abound in decaying wood, manure, rotting fruits and vegetables, and fungus growth. (it) Dady-long-legs (Tipulidae). The larvae usually live in moist soil, muddy waters or decomposing materials and feed upon decaying vegetable matter. (ii) Sand flies (Psychodidae). The larvae live in water or in moist organic matter. (iv) Midges or gnats (Chironomidae). These insects feed upon decayed organic matter in moist situations. (0) Hover flies (Syrphidae). This larvae of several species are scavengers on all kinds of decaying organic matter. (vi) House flies (Muscidae). The larvae of house flies and related insects develop in decaying animal or vegetable matter. (vii) Root maggot flies (Anthomyiidae). The larvae feed upon decaying vegetable matter.

Human Food

Insects play a key role in energy flow through the ecosystem, principally as herbivores but also as predators and parasitoids, which may themselves be consumed by higher level insectivorous vertebrates. In turn, some of these vertebrates, are eaten by humans. Frogs and many reptiles are well known for eating insecta. Some highly prized game birds and fish depend upon insects for a large proportion of their food. Chickens and turkeys, so famous for their meat, can be raised almost exclusively on insects under proper conditions.

In many parts of the world, from ancient time to the present day, insects have been extensively consumed by man. The eating of insects by man or other animals is known as entomophagy. Insects are a rich source of essential nutrients including proteina, amino acids, fats, minerals and vitamins. Grasshoppers, crickets, beetles, caterpillars, pupae of moths and butterflies, termites, large ants, ant and aquatic insecta' eggs, aquatic bugs, cicadas, and bee brood and pupae have been prized as food for most of the primitive races of the world including India.

Mexico: Of about 500 species of insects used as human food, approximately 40 per cent are utilized by the Mexicans. Their list of food insects includes bugs, beetles, ants and bees, and moths and butterflies. Maguey worms (Aegiale hesperiaris) are commonly eaten in Mexico and are exported as gourmet food to North America, France and Japan. Mexican caviar (eggs of many species of Hemiptera), locally called 'ahuahutle', is quite popular in Mexico. Both the maguey worms and ahuahutle were used to be exported to USA. However, shipment of ahuahutle to North America no longer occurs because of lake pollution. Nevertheless, it can still be found in many markets and restaurants in Mexico and is exported to Europe as bird and fish food. The other insects which are eaten in Mexico include the larvae of a butterfly (Eucharia socialis), locally called 'madrono worms; larvae of an ant (Liomatopum apiculatum), locally called 'escamoles'; and a grasshopper (Spherarium spp.).

USA: Aboriginal people of the Great Basin region in the south western united states traditionally spent much time and effort harvesting a variety of insects, principally crickets, grasshoppers, shore flies (especially the pupae), caterpillars, ant ants (adults and pupae), though bees, wasps, stoneflies, aphids, lice and beetles were also consumed. Some of the insects were eaten raw though most were baked or roasted before consumption. Further, large quantities, especially of grasshoppers and crickets were dried and ground to produce that was stored for use in winter

Australia: In parts of south eastern Australia, the Bogong moth (Agrotis infusa) would aestivate from December through February in vast numbers in the rock shelters. Hundreds of aborigines from different tribes would gather under the Bogong mountain of New South Wales to have a feast of these moths. Some tribes would make an annual trek over a considerable distance (up to 200 km) to take advantage of this seasonal food source, returning each year to the same area. Rocks covered with layers of these moths are scraped to dislodge them and collect them from the cave floors. In central Australia, the caterpillars of the Wutchery moth (Xyleutes leuchmochla) constitute a staple food for children and women.

Africa

In some African countries (including Botswana, South Africa, Zaire, and Zimbabwe), there is a thriving trade in mopanie caterpillars (Gonimbrasia belina), and when these are in season, beef sales may show a significant decline. Termites (both Microtermes spp. and Macrotermes spp.) are consumed in Angola, Uganda, Zaire, Zimbabwe and Kenya. The desert locust (Schistocerca gregaria) has been a favourite food in northern Africa for a long time.

Asia: The giant water bug (Lethocerus indicus) is a delicacy in Thailand. The males of the bug are preferred because of their having a unique flavour perhaps due to their sex pheromone glands. Large number of larvae and cocoons of silk worm (Bombyx mori) are imported from China for use in restaurants in Bangkok. In Korea, grasshoppers, and larvae

and cocoons of silkworm are consumed. Giant water bugs and pupae of silkworm are exported to Asian community stores in USA from Thailand and South Korea, respectively.

Japan: In Japan, the rice grasshopper (Oxya velox), locally called 'inago', is the most widely eaten insect. Catching inago has a poetic charm in the country and some elementary schools arrange an inago hunt every year in which parents are also invited to participate alongwith their wards to collect the insects. Locusts have been eaten by farmers in India for a long time particularly when after a locust attack, nothing was left for them to eat. There are many tribes in different states of the country which eat insect eggs, caterpillars, termites, grasshoppers, etc.