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New host record of *Aulacophora indica* (coleoptera: Chrysomelidae) on *Juniperus polycarpos* C. Koch in district Kinnaur, Himachal Pradesh

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Abstract
All conifers are susceptible to variety of insect pests attacks. Juniper is a dominant Conifer species of its zones of distribution and fulfills multipurpose requirements of the local inhabitants. *Juniperus macropoda* syn. *polycarpos* or Juniper is a unique ecosystem and is considered as the oldest living creatures on the surface of earth and also known as 'Living Fossil'. It is one of the indigenous Junipers found in the cold arid areas of Himachal Pradesh and Jammu & Kashmir. It is mainly distributed in Kinnaur and Lahaul & Spiti district of Himachal Pradesh and also in Gurej valley of Jammu & Kashmir and Ladakh region. It is a moderate sized tree attaining a height of 15-25m with light opening foliage. It bears dimorphic leaves i.e. acicular as well as scale- like leaves. It belongs to the family Cupressaceae. Many of regeneration failure in conifers are often been attributed to heavy insect attack during the period of seed formation and under storage conditions. The surveys were conducted to monitor the insect pests feeding on different trees of district Kinnaur, Himachal Pradesh. Different insect pests were collected from the host trees of the region. During the study, insect species belonging to the order Coleoptera was reported from district Kinnaur feeding voraciously on *Juniperus polycarpos* (commonly known as Juniper). The insect was found feeding on the leaves of *J. polycarpos.* The insect species was identified as a *Aulacophora indica* (Coleoptera: Chrysomelidae) is also a new record on the new host *Juniperus polycarpos* (commonly known as Juniper), widely distributed in the cold desert area of distt. Kinnaur, Himachal Pradesh.

Keywords: coleoptera, juniper, insect species, new host

Introduction
Junipers are one of the most versatile conifers distributed all across the northern hemisphere, from the arctic region to tropical Africa, Central Asia, South-Asia to eastern Tibet and mountainous regions of Central America. They occur both in tree as well as in shrubby form and grow in different climatic conditions ranging from cold arid regions tohot deserts. There are about 67 species of Junipers found throughout the world (Adams, 2004) [1]. Among them, *Juniperus polycarpos* C. Koch is one of the most important species which occurs in dry temperate regions of the Himalaya from Nepal westwards to Uttarakhand, Himachal Pradesh, Jammu & Kashmir and Ladakh, Pakistan and Afghanistan at altitude of 5,000-14,000ft. amsl (Anon, 1959) [2]. In its zone of occurrence, it is commonly called as "Shur", "Shukpa", "Shurgu" or "Shuru" in Himachal Pradesh and "Lashuk" in Ladakh, India. In Himachal Pradesh, it is mainly distributed in semi-arid and cold desert areas of Kinnaur and Lahaul & Spiti districts and occupies 208.41Km^2 area(0.40%) of the total geographic area (Chandrasekhar *et al.,* 2003) [4]. This conifer species has immense socio-ecological, cultural and religious significance in its zone of distribution. The wood is used as fuel wood, dried twigs and needles are used as incense in houses, temples and monasteries for performing various religious rites in its zone of occurrence. The leaves, twigs and fruits are also used to treat rheumatic pains (Aswal and Goel, 1989) [3].

The surveys were conducted to monitor the insect pests feeding on different trees of district Kinnaur, Himachal Pradesh. Different insect pests were collected from the host trees of the region. During the study, insect species belonging to the order Coleoptera was reported from district Kinnaur feeding voraciously on *Juniperus polycarpos* (commonly known as Juniper). The insect was found feeding on the leaves of *J. polycarpos.* The insect species was identified as an *Aulacophora indica* (Coleoptera: Chrysomelidae) is also a new record on the new host *Juniperus polycarpos* (commonly known as Juniper), widely distributed in the cold desert area of distt. Kinnaur, Himachal Pradesh. During the present investigations, identification of the insect species was updated along with its habitat and infestation potential on the new host. Possible control measures have also been discussed which can be effectively applied to contain the pest infestation. Earlier, Kumar (2015) has reported seed borer, *Plodia interpunctella* hübner (Lepidoptera: Pyralidae) infesting seeds of Chilgoza pine (*Pinus gerardiana* wall.) in the same study area. The studies conducted by Kumar and Sharma (2022) [6] were also consulted to examine the current status of insects of the region.

Materials and Methods
The survey tours were conducted during 2018 to 2021 to monitor the insect pests infestation in the forests of the distt. Kinnaur. Various insect species were found attacking trees and plantations of Juniper predominating in the area. One of the dominant tree species *i.e. Juniperus polycarpos* raised was found to be attacked by the beetle at an altitude of 3268m amsl. Subsequently, the samples of beetles were collected from the field plantation area and brought to the laboratory of Himalayan Forest Research Institute, Shimla for correct identification and rearing of the beetle to study its life cycle.


Fig 1 & 2: *Juniperus polycarpos* plantation at Mujlang (Chhitkul) Kinnaur, Himachal Pradesh

Results and Discussion

The specimens of the beetle were collected from the field plantation area was identified as *Aulacophora indica* (Coleoptera: Chrysomelidae), commonly known as Red Pumpkin Beetle. The detaled classification of the identified beetle is as follow:

Name of Pest: *Aulacophora indica*
Common Name: Red Pumpkin Beetle.
Taxonomic Placing:
Kingdom: Animalia
Phylum: Arthropoda
Subphylum: Hexapoda
Class: Insecta
Order: Coleoptera
Family: Chrysomelidae
Genus: *Aulacophora*
Species: *indica*

The body of adult beetle is about 7 mm long, bright orange-red in colour except for the black colour on ventral side of thorax and abdomen. The larva is yellow-white, head dark-brown, up to 15 mm in length.

Fig 3: *Aulacophora indica* feeding on *Juniperus polycarpos.*

Fig 4: *Aulacophora indica* Adult Beetle

Geographical distribution: The pest is widely distributed in different parts of the world, especially in Asia, Africa, Australia and South Europe, India and Pakistan. It occurs throughout the country but is more common in north-western parts.

Host Plants: The Red Pumpkin Beetle generally infests plants belonging to cucurbitaceae family. The cucurbits are the prominent host of this beetle and it causes diseases in cucumber, melon, pumpkin, watermelon and gourds. The similar species are pests of these plants in Papua New Guinea, Indonesia, Philippines, Japan, India and Australia.

Life history: The female laid yellow, oval eggs singly or in batches in soil around the base of the host. After 5-15 days, they hatch and the cream-white young (called "larvae") burrow into the soil to feed primarily on the roots. Four moults occur over 14-25 days, and then the larvae enter the pupa stage in an earth chamber; this lasts another 7-20 days

before the adults emerge. The females laid up to 500 eggs and live as long as 10 months. This means, there are several overlapping generations each year.

Laboratory rearing of *Aulacophora indica*

The rearing of *Aulacophora indica* beetle was carried out in the Forest Protection Laboratory. Two litre capacity beakers were sterilized in the oven. The shoot bearing needles of *Juniper polycarpos* were cut in to small pieces and placed in small jar filled with water (this will keep juniper leaves green and moist for longer duration).The beetles collected from the plantation area were placed in the beaker and artificial diet containing cotton soaked in glucose solution was also given to the adults kept in the beaker and finally covered it with muslin cloth and secured with a rubber band. The rearing of this beetle was carried out in insect growth chamber under controlled conditions maintaining 60-70% humidity and 26°-28°C temperature in the laboratory for six months period for further observation. The beakers were cleaned daily to keep the culture safe from any kind of contamination. No eggs were reported even after six months period of rearing in the laboratory. Identification of the Pumpkin beetle was done with the help of appropriate literature and taxonomic keys.

Fig 5: Rearing of *Aulacophora indica* in the Laboratory

Economic importance

The larva of this beetle feeds on roots and causes root rot and withering. The adults' feeding on seedlings may retard development and even death, resulting in bare patches in the field. The beetles sometimes aggregate on and gnaw the foliage of older plants, which become skeletonized and may drop. Flower parts can also suffer some damage, resulting in reduced fruit setting. The lower parts of young fruits show scars caused by adult feeding, enabling the invasion by rot-causing microorganisms. In some cases 90% of the crop may be lost.

Impact

Adults feed on leaves, chewing large holes. Seedlings are particularly susceptible, and so are young plants after planting out. The damage to young plants can delay crop maturity. Damage also occurs to flowers and small fruit. The larvae probably damage roots and stems. This type of damage may allow entry of other organisms, especially fungi.

Management of *Aulacophora indica* in the Plantation:

1. Physical control

1. **Manual Collection and Disposal:** The live beetles were collected manually during infestation and disposed by putting them in the pits followed by complete burning.

Fig 6: Manual Collection and Disposal of Beetle

2. **By Using Stick Traps**: Yellow sticky traps were used to monitor and mass trapping of beetles in the infestation area.

3. **Cultural methods:** Light irrigation which did not moisten the roots helped in killing eggs due to desiccation.

2. Biological Control:

1. **Natural enemies:** There is little known about the natural control of these beetles. The beetles contain chemicals that visual predators do not like, and are avoided by them. The bright colour of this beetle warns predators that they are distasteful.

2. **Cultural control:** Avoid planting of new seedlings adjacent to the already infested plantation area with the beetles. Provide adequate conditions for healthy and rapid growth of seedlings in the plantation area by providing farm yard manures and/or commercial fertilizers, and water. The beetles usually tend to infest some plants in patches, leaving others free from infestation, therefore, it is possible to catch the beetles manually during the day time and this is a very useful control method.

3. Chemical Control

1. **Control by using Wood Ash:** Application of ½ cup of wood ash and ½ cup of lime in 4 L water was very effective against infested plants.

2. **Control by using Botanicals:** The plant based botanicals such as neem extracts, derris or Pyrethrum extracts have been successful in controlling beetle infestation on Juniper.

3. **Control by using Insecticides:** 0.5% solution of Chlorpyriphos insecticide is effective to control this pest. This is a very effective chemical method for control of beetle attack on Juniper seedling in the field.

References

1. Adams RP. Junipers of the World: The genus Juniperus. Victoria: Trafford, 2004. ISBN 1-4120-4250-X
2. Anon. The Wealth of India, Raw Materials, H-K. Publication andInformation Directorate (CSIR), New Delhi, 1959:5:306-311.
3. Aswal BS, Goel AK. Less- known medicinal uses of three plants from Western Himalaya (India). Economic Botany,1989:43(3):419-420.
4. Chandrasekhar MB, Singh S, Roy PS. Geospatial Modeling Techniques for Rapid Assessment of Phytodiversity at Landscape level in western Himalayas, Himachal Pradesh. Current Science,2003:84(5):663-670.
5. Kumar P. Studies on seed borer, *Plodia interpunctella* Hübner (Lepidoptera: Pyralidae) infesting seeds of Chilgoza pine (*Pinus gerardiana* wall.*).* Indian Forester,2016:142(4):394-399.
6. Kumar P, Sharma N. Checklist of moths (Lepidoptera) of the cold deserts of Leh and Spiti, India. J. ent. Res.,2022:46(2):403-407.
7. Negi PS, Sharma S. Effect of pre-sowing treatments on seed germination and seedling vigour index of *Juniperus polycarpos* C. Koch. Indian Forester,2017:143(7):438-652.