OUTBREAK OF DASYCHIRA SP. IN PINE FOREST OF SWAT

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Abstract. *An out-break of pine defoliator* (Dasychira *sp.*) *occurred in 1977 in about 900 hectares of Chir pine forest in Swat. About 190 hectares of the forest was defoliated very heavily. The pest preferred southern, eastern and western aspects as an average population per tree on these aspects, respectively, was 1484, 1168 and 1031 with corresponding defoliations. Population per tree on northern aspects was 506 with medium defoliation while in most shady places and deep nullahs defoliation was either light or negligible with lowest population (208 per tree). An average population of 1788, 794, 571 and 208 larvae per tree, respectively, caused complete, heavy, medium and light defoliations.*

A larval and pupal parasite, Monodontomerus dentipes *Boheman controlled the pest. At the end of the season a parasitism of 99.7% pest population was observed.*

Introduction. *Dasychira* sp., caterpillars of which have long dorsal yellowish-brown tufts of hair and black pencils of hair on Ist and IIth segments, is a serious pest of forest trees. Some species have been reported defoliating pines in U.S.A. and West Germany. In Pakistan it has not been recorded as a pest of pine trees before it appeared in epidemic form in 1977 in Chir pine forest (*Pinus roxburghii*) in Swat. A vast area covering dense to open crop consisting of pole to middle aged trees, was defoliated seriously at an elevation of 1000 to 1700 metres above sea level. In an over-all outbreak heavy defoliation occurred in patches. This study, conducted in December, 1977 when pupal cocoons of the last and previous generations were present on trees, aimed to assess population of the pest, extent of defoliation and the natural parasitization.

Review of literature. Sreenivasam et al (1972) reported *Dasychira plagiata* (Wlk.) as an important defoliator of jack pine (*Pinus banksiana*) and red pine (*P. resinosa*) from north-western Wisconsin and east-central Minnesota in U.S.A. Bionomics of the pest is also given. Klimetzek (1972) described the occurrence of *Dasychira pudibunda* (L.) in the Palatinate (West Germany) since 1810 analysing historical data in forestry districts. The most important infestations have been reported in 1892-1895, 1901-1903 and 1941-1944. From about 1940 this pest showed a marked increase which infested pine in the mountainous districts of central and the northern Pfalzer Wald. Bollen et al (1970) tried Zectran against larvae of pine tussock moth (*Dasychira* sp.) using 0.15 lb/acre in the United States. Low dose of 1-10 P.P.M. in an oil carrier has been recommended for pest control in forestry without any adverse effect on soil micro-organisms.

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Sampo (1968) has published notes on three lepidopterous species that normally feed on the leaves of deciduous trees in Italy but have recently been observed on conifers. One of them is *Dasychira selenitica* (Esp.), which was found defoliating young larch trees during 1958 in a reafforestation area of the Maritime Alps, having migrated to them from surrounding patches of *Sarothamnus scoparius*. Bullock and Smith (1968) found *Epijoppa fumosa* Morl., parasitizing pupae of *Dasychira georgiana* and effectively keeping the population under check. Bionomics and outbreak of the pest and its control with insecticides is also given.

Urban (1967) attributed the collapse of an outbreak of *Dasychira pudibunda* (L.) to a cytoplasmic polyhedrosis virus, *Smithiavirus pudibundae* in Beech forests of the Neubrunn and Henneberg districts in Germany. Results are given of light and electron-microscope observations on infested larvae. Ghazi-Bayat (1967) studied the morphology, biology and ecology of *Dasychira selenitica* (Esp.) and reported it occurring in large numbers in Bavaria (Germany) in 1960-1963 on various plants and tress, in forest cleanings and at forest edges particularly in stands of young pine mixed with other trees, causing considerable damage to oak and young larch. Lyon et at (1967) tested six insecticides by topical application on 4th instar larvae of *Dasychira* sp. nr. *grisefacta* which had defoliated 42,000 acres of *Pinus ponderosa* in Montana. Contact toxicity of LD 90, in descending order was, Pyrethrins, Zectran, Malathion, DDT, SD 8530, and carbaryl. Geispits and Zarankina (1963) worked out the photoperiodic reaction and the effect of temperature on the development of *Dasychira pudibunda* (L.) in the Soviet Union, where this Lymantrid occurs from north of Leningrad to the extreme south sporadically as a pest of various trees. The results showed that growth processes were affected by photoperiod and that the duration of development was prolonged as temperature increased. Koehler (1958) recorded *Dasychira pudibunda* on oak in 1945-1957. Spraying was done but parasites effectively controlled them.

Method and material. A map indicating defoliated area spread over compartments 36 to 40, 42 and 43 of Swat range and 15 and 16 of Buner range was traced from the forest range maps. The area was surveyed physically and the incidence of insect attack was marked on the map. Defoliated areas were observed from 3 highest points and marked on the map. Compartments 36 to 38 and a part of 39 were clearly visible from compartment 43 while compartments 39, 40, 42 and 43 were observed from compartment 37 and compartmens 15 and 16 of Buner range from western side of compartment 39. Defoliation from these points was observed under three categories as heavy (trees looking dry) medium (trees with brown colour) and light (trees with brownish green colour). Study was conducted at 12 points, one at least in each compartment. Points were selected on different aspects in all the three catagories of defoliation. Five trees were randomised at each point for assessment of population of the pest. First a tree was randomised in the centre by walking straight on one direction and counting the trees coming across to reach the 20th tree from the starting point. Taking this tree as a base 4 other trees at right angle from each other were selected by walking straight and taking 15th tree one each on western, eastern, southern and northern directions. For assessment of population each tree was divided into three parts—stem, main branches and shoots of main branches as cocoons were present on these parts only. All cocoons on stem and main branches were counted starting from the base and climbing

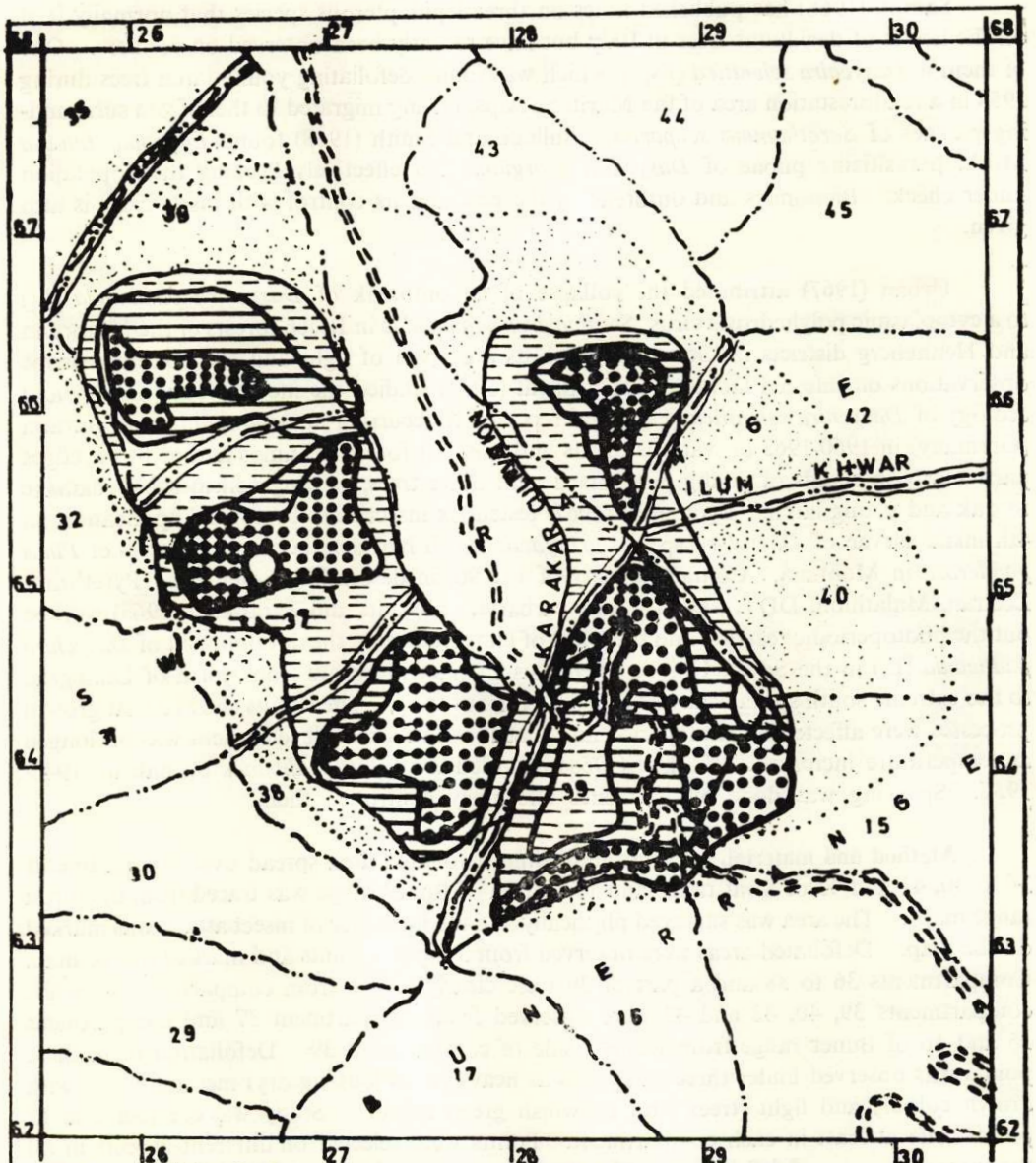

FIG. 1 : MAP SHOWING CHIR PINE AREA INFESTED BY DASYCHIRA SP. IN SWAT AND BUNER RANGES.

up the tree while on shoots counting was made from the ground. The population on all the parts was added to obtain total population of insect cocoons per tree. Five hundred cocoons were collected at each point from the randomised trees for the assessment of parasitism. Each cocoon was cut open in the laboratory at Peshawar and observations on living, dead and parasitized pupae was recorded.

Results and discussion. The pest population was found over an area of about 900 hectares in Chir pine forest falling mainly in Swat Range and partly in Buner Range. The tree carried varied population of the insect pest and accordingly the extent of defoliation differred in various localities and aspects of the forests. The pest population census and the extent of tree defoliations recorded on various site aspects are shown in Fig. 1 and in the table below:

TABLE 1

Relationship between aspect, population per tree and extent of defoliation

Aspect	Population per tree		% defoliated trees		
	Average	Range	Heavy	Medium	Light
Southern	1484	660—2856	87	13	0
Eastern	1168	630—2460	73	27	0
Western	1031	610—1900	70	30	0
Northern	506	383—600	0	100	0
Shady places and nullahs	208	130—287	0	0	100

The pest preferred southern, eastern and western aspects with maximum population per tree (1484) on southern aspects followed by eastern (1168))and western (1031) aspects. Population per tree was low (506) on northern aspects and the lowest (208) in most shady places and deep nullahs. The number of heavily defoliated trees was greater on southern aspects followed by eastern and western, where most of the trees were completely denuded of foliage. The number of trees defoliated up to 50% was highest on northern aspects and lowest on soutern aspects. All trees were defoliated lightly in most shady places, on sides of nullahs and negligibly away from the centre of heavy defoliation and at the base of nullahs.

TABLE 2

**Larval population per tree on variously defoliated trees.*

	Completely	Heavily	Medium	Light
Range	1020—2856	702—903	383—670	130—287
Average	1788	794	571	208

*Based on puparia present on the trees.

More than one thousand larvae per tree (average 1788) defoliated trees of all ages completely when population reached the limit either of one generation or the other during April to November. Similarly population between 700 and 900 (average 794) and about 400 and 700 (average 571) per tree caused heavy and medium defoliation, respectively when population reached the limits any time during this period. Defoliation remained light or insignificant when population remained below 300 larvae per tree (Table-2).

A hymenopterous parasite of the pest, *Monodontomerus dentipes* Boheman (Family, Torymidae) naturally existed in the area. At the time of pest population census observations were also recorded on the extent of parasitism which existed at the end of the season in the month of December:

TABLE 3

Extent of Parasitism on Dasychira *sp.*

Total No. of larvae/ pupae	Parasitized larvae/ pupae	% Parasitism in		
		Larvae	Pupae	Total
1681	1677	24.87	74.89	99.76

The parasite seems to have very high reproductive potentials as it out-numbered and over powered the pest population within 6-8 months. The insect pest population multiplied repidly and causad serious defoliations of *Pinus roxburghii* over an area of about 190 hectares. The parasite finding plenty of food also bred tremendously resulting in 99.76% parasitism of the pest population in December leaving only 0.24% population to carry forward to the next spring with enormous parasite population to starve to death. The pupae of the pest found parasitized were collected and kept in the laboratory which gave rise to 10-27 adult parasites per pupa.

The insecticidal use in such situations would have hampered parasite population build-up resulting in continued multiplication of the pest in addition to the waste of money spent on spraying the vast area. The pest with lessor natural check would have then increased enormously to spread in wider areas in the next spring and more sprayings would have aggravated the situation further involving larger and larger areas, recuring every year, calling for continuous spraying programmes and real threat to the existence of the Chirpine forests in the region. It is therefore always advisible to check up parasite—predator populations in an insect outbreak area before resorting to insecticidal use particularly in natural forests where generally a good complex of parasites and predators exists.

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