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DIVERSITY AND DAMAGE ASSESSMENT OF SNAIL IN CULTIVATED CROPS OF NEELABUT BAGH AZAD JAMMU AND KASHMIR (PAKISTAN)

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ABSTRACT

The present study was conducted to study diversity and damage assessment of snails in cultivated crops and ornamental plants. The study revealed two types of snail species *Macrochlamys indica* and *Indoplanorbis exustus* in the study area. The sampled plots of tomato, Karam, Palak, Dhanial, Maize, Fresh beans, Sunflowers, Aloe Vera, Loki, Pumpkin, Bitter guard, Kheera, Kachmach, Hund were taken. The study revealed that at Neelabut, when 39 plants of Fresh beans were examined out of them 18 were found damaged and the damage percentage was 46%, 38 plants of sunflowers were examined and 17 (45%) were found damaged, 85 plants of tomato were examined and 11 (12.94%) were found damaged, 82 plants of Karam were examined and 12 (15%) were found damaged, 62 plants of Palak were examined and 16 (25%) were found damaged, 51 plants of maize were examined and 15 (29%) were found damaged. The snail is pest in the study area and measures should be taken to manage them through ecofriendly programs.

Key words: Snail, diversity, crops, pest.

INTRODUCTION

Snails are found at an altitude of up to 1830 meters and preferred habitats are chalk and limestone fields, grapevine gardens bushes, and moist parks with daily temperatures but not heavy rains or direct sunlight. Snails are also largely deficient in the food supply in deciduous and mixed forests in coniferous forests. They prefer to live on alkaline, calcareous soils. An open and semi-open-area species is *Helix pomatia*. Some snails inhabit anthropogenic sites such as urban parks, orchards, cemeteries, garbage heap communities, and various sections of wastelands, in addition to natural and woodland edge areas, riparian woods, and meadows in river valleys and around bodies of water (Stepczak, 1976).

Snails are the micro-arthropods environmental and prey indicators and are important for the functioning of the ecosystem (Coleman et al., 2007). Snails

in some parts of the world are agricultural pests, human health pests, and cause significant declines in biodiversity (Yeung and Hayes, 2018). Crop pests control field crops, fruits, cereals, ornamental plants, maize, roots, and leaves in agriculture (El-Okda, 1981). A lot of studies on invertebrates are present in Azad Jammu and Kashmir such as diversity of invertebrate (Hassan et al., 2018, Faiz et al., 2019) but the present study was carried out to determine the population density and damage assessment of land snail.

MATERIAL AND METHODS

Study Area

The Dhirkot subdivision is situated in the southwest of the Bagh District, a town in the Bagh District, Azad Kashmir, Pakistan. It is 25 km away from Kohala, 63 km away from Muzffarabad, and 132 km away from Islamabad. Having latitudes

north of 34.0357° or 34° 2 '8.5' and longitudes east of 73.5798 ° or 73 ° 34 '47.2. The Dhirkot subdivision is located at an elevation of 1629 meters (5344 ft.). The weather of this region is a subtropical moist and moderately humid, by extreme rainfall in July (95.5 mm) and August (89.0 mm respectively. Due to its position at high altitudes, the weather remains good in summer. June and July are the hottest months, with average temperatures of 25 °C and 24 °C correspondingly. The high temperature often increases to 29 °C. January and February are the coldest months, and average temperature is 5.4°C.

Surveyed Sites

The sample plots of crops, ornamental plants and wild vegetation at sites Narwal, Dhirkot, and Neelabut were selected. The snail was sampled by visual encounter method and for damage

assessment one plot on each site were selected. The damage assessment of snail was done by following formula:

$$\text{Damage assessment} = \frac{\text{infested plants}}{\text{Total plants}} \times 100$$

RESULTS AND DISCUSSION

The study documents two types of snail *Macrochlamys Indica* and *Indoplanorbis exustus* in three study sites. Snail damage assessment in ornamental plants, *Aloe arbadensian*, *Tagetes*, *Cestrumnocturnum*, *Viola oderata* is given in Table 1.

The damage in vegetables tomato (*Solanumly copersicum*), Karam (*Brassica eruca*), Palak (*Spinacia oleracea*) and Dhania (*Coriandrum sativum*) though a total number of 60 plants were examined among them 17 were found damaged and 43 undamaged (Table 2).

Table 1: Plants damage caused by snails in ornamental plants

Name of Plants	Botanical Name	TNP	D plants	UD Plants	% age
Aloe Vera	<i>Aloe arbadensian</i>	10	5	5	50%
Marie gold	<i>Tagetes</i>	24	3	21	12.5%
Raat ki rani	<i>Cestrum nocturnum</i>	13	1	12	8%
Gul e Banafsha	<i>Viola oderata</i>	8	6	2	75%
Total		55	15	40	27.3%
Aloe Vera	<i>Aloe Barbadensian</i>	22	5	17	23%
Marie gold	<i>Tagetes</i>	20	3	17	15%
Raat ki rani	<i>Cestrum nocturnum</i>	10	6	4	60%
Gul e Banafsha	<i>Viola oderata</i>	8	6	2	75%
Total		60	20	40	33.3%
Aloe Vera	<i>Aloe Barbadensian</i>	14	2	12	14%
Marie gold	<i>Tagetes</i>	23	8	15	35%
Raat ki rani	<i>Cestrum nocturnum</i>	10	6	4	60%
Gul e Banafsha	<i>Viola oderata</i>	6	2	4	33%
Total		53	18	35	34.0%

TNP (Total number of plants) D (Damaged plants) UD (Undamaged plants)

Table 2: Damage assessment in vegetable crops

Plants	Botanical Name	TNP	D Plants	UD plants	% age
Tomato	<i>Solanumlycopersicum</i>	19	3	16	15%
Karam	<i>Brassicaeruca</i>	18	5	13	27%
Palak	<i>Spinaciaoleracea</i>	13	7	6	53%
Dhania	<i>Coriandrumsativum</i>	10	2	8	20%
Total		60	17	43	28.3%
Tomato	<i>Solanumlyco persicum</i>	12	0	12	87%
Karam	<i>Brassica eruca</i>	10	2	8	20%
Palak	<i>Spinacia oleracea</i>	8	3	5	37%
Dhania	<i>Coriandrum sativum</i>	10	0	10	0%
Total		40	05	35	12.5%
Tomato	<i>Solanumly copersicum</i>	25	4	21	84%
Karam	<i>Brassica eruca</i>	15	2	13	13%
Palak	<i>Spinacia oleracea</i>	10	1	9	10%
Dhania	<i>Coriandrum sativum</i>	15	3	12	20%
Total		65	10	55	15.4%

TNP (Total number of plants) D (Damaged plants) UD (Undamaged plants)

Table 3: Damage assessment in fodder crops

Name of Plants	Botanical Name	TNP	D plants	UD plants	% age
Maize	<i>Zea mays</i>	12	1	11	8%
Fresh Bean	<i>Phaseolus vulgaris</i>	10	3	7	30%
Sun Flower	<i>Helianthus</i>	8	6	2	75%
Musturd	<i>Brassica nigra</i>	5	0	5	0%
Total		35	10	25	28.6%
Maize	<i>Zea mays</i>	10	3	7	30%
Fresh Bean	<i>Phaseolus vulgaris</i>	2	2	0	100%
Sun Flower	<i>Helianthus</i>	2	1	1	50%
Musturd	<i>Brassica nigra</i>	6	2	4	33%
Total		20	8	12	40%
Maize	<i>Zea mays</i>	7	5	2	71%
Fresh Bean	<i>Phaseolus vulgaris</i>	9	6	3	66%
Sun Flower	<i>Helianthus</i>	8	4	4	50%
Musturd	<i>Brassica nigra</i>	4	2	2	50%
Total		28	17	11	60.7%

TNP (Total number of plants) D (Damaged plants) UD (Undamaged plants)

Table 4: Damage assessment in fruit

Name of Plants	Botanical Name	TNP	D plants	UD plants	% age
Pumpkin	<i>Cucurbita maxima</i>	10	2	8	20%
Loki	<i>Bottle guard</i>	14	8	6	57%
Bitter guard	<i>Momrdica Charantia</i>	10	4	6	40%
Kheera	<i>Cucumussativus</i>	11	6	5	54%
Total		45	20	25	44.4%
Pumpkin	<i>Cucurbita maxima</i>	12	4	8	33%
Loki	<i>Bottle guard</i>	23	7	16	30%
Bitter guard	<i>Momrdica Charantia</i>	12	8	4	66%
Kheera	<i>Cucumussativus</i>	6	4	2	66%
Total		53	23	30	43.4%
Pumpkin	<i>Cucurbita maxima</i>	16	5	11	31%
Loki	<i>Bottle guard</i>	11	3	8	27%
Bitter guard	<i>Momrdica Charantia</i>	13	4	9	30%
Kheera	<i>Cucumussativus</i>	0	0	0	0%
Total		40	12	28	30.0%

TNP (Total number of plants) D (Damaged plants) UD (Undamaged plants)

The damage in Maize (*Zea mays*), Fresh beans (*Phaseolus vulgaris*), Sunflower (*Helianthus*) and Mustard (*Brassica nigra*), though a total number of 163 plants were examined among them 61 were found damaged total percentage of damaged plants were 37.42% (Table 3). Though a total number of 247 plants (Wines) were examined among them 100 were found damaged total percentage of damaged plants were 40.48% (Table 4).

DISCUSSION

Our study reports two type of snail exist in the study area and similar type of reports exist in Indian Kashmir (Allaie et al., 2019). Type one is horn type snail (*Macrochlamys Indica*), (*Indoplanorbis exustus*). The distribution of these two species has been reported by (Allaie et al., 2019) in central Kashmir at Srinagar. The study site NeelaBut is at distance of 40 km from Srinagar. The present study describe the pest nature of snail of vegetable crops, ornamental plants and coniferous forest while the pest nature of snail have been

described by a number of studies (Jagtap et al., 2000).

Our study reports pest nature of snail in *Cucurbita maxima*, *Bottle guard*, *Momrdica Charantia*, *Cucumus sativus* whereas similar reports of damage to vegetable have been reported by various authors (Kaur et al., 2014). Our study reports pest nature of snail in ornamental plants, *Aloe arbadensian*, *Tagetes*, *Cestrum nocturnum*, *Viola oderata* whereas similar reports of damage to ornamental plant nurseries, fodder crops have been reported by (Shilpa et al., 2012) in his PH.D research work.

Our study reports pest nature of snail in fodder crops *Zea mays*, *Phaseolus vulgaris*, *Helianthus*, *Brassica nigra* whereas similar reports of damage to ornamental plant nurseries, fodder crops have been reported by (Shilpa et al., 2012) in his PH.D research work. Our results indicate that nature and extent of damage goes increase with increase in population density of snail and among two species of snail the horn type of snail (*Macrochlamys Indica*), is dominant over the species

(*Indoplanorbis exustus*). The horn type of snail (*Macrochlamys Indica*) prefer shady areas with moist places while the (*Indoplanorbis exustus*) prefer drier habitat sunny areas. Both two species are found to exist in some study sites but in co-existence sites only (*Indoplanorbis exustus*) was dominant and found in abundance while the horn type of snail (*Macrochlamys Indica*) was too much less in numbers in such areas.

CONCLUSION

The present study is base line study that provide diversity and damage caused by snail in Azad Jammu and Kashmir. The present study documents, damage caused by snail which is unnoticed and need attention to control by ecofriendly method.

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