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# FIRST REPORT OF *Deroceras* sp. (GASTROPODA, PULMONATA, AGRIOLIMACIDAE) AS PEST OF AGRICULTURAL CROPS IN KASHMIR VALLEY (INDIA)

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**AUTHOR'S CONTRIBUTION** 

The sole author designed, analysed, interpreted and prepared the manuscript.

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Short communication

# ABSTRACT

*Deroceras* sp. (Gastropoda, Pulmonata, Agriolimacidae) is being reported for first time from Kashmir Valley (India). It was found a pest of agriculturally important crops like beans, brassicas (Kale, kohlrabi), potato, radish, sugar beet etc. and caused minor to moderate, but significant damage of these agriculturally important crops. Preliminary investigation reveals that this species might be *Deroceras laeve* (Muller 1774) that is already widely distributed in nearby countries like Butan, China, Pakistan, and Nepal. It suggests that this slug might have been in this part of the world for some time. Surveys and taxonomic studies are required to be conducted to confirm its species. Moreover, further investigation will reveal its distribution and pest status in other parts of Jammu and Kashmir.

Keywords: Beans; Brassica; Deroceras; Kashmir; Pest.

# **1. INTRODUCTION**

Land snails constitute about six per cent of the total species on Earth [1], among which, some terrestrial slugs consistently have been reported as agricultural and horticultural pests [2,3]. These slugs feed by scraping the plant surface and eating large ragged holes in the leaves of plants. According to some studies, they completely consume young seedlings and cause great harm to both oil seed plants, citrus, peach, palm, vegetables and attack roots, even stems and tubers (https://ento.psu.edu/extension/factsheets/pdf/slugspdf ). Apart from this, land mollusks leave viscous liquids and unpleasant slimy tracks on the injured parts of plant upon which they feed [4], which makes the vegetable plant unfit for human consumption.

This genus *Deroceras* (Family: Agriolimacidae) is one of the commonly occurring slug which is represented by 123 species worldwide [5]. Among these, two species *viz.*, *D. reticulatum* (the gray garden slug) and *D. laeve* (the marsh slug) are well known plant pests [6,7,8,9,10,11,12]. *D. reticulatum* Muller is cosmopolitan slug [13] and *D. laeve* (Muller), a native to North America, which has invaded many other parts of the world, including in Butan [14], China [5], India [15], Nepal [16,17] and Pakistan [18,19].

The molluscs present in Kashmir are dominated by freshwater and terrestrial snails and there are about 35 species of fresh water mollusks in J&K, belonging to 8 families and 16 genera [20]. However, hither to, the genus *Deroceras* has not been reported from Kashmir. So, this communication reports genus *Deroceras* for

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the first time, from Kashmir region. It is reported as minor to moderate pest of some agriculturally important plant crops in this region.

## 2. MATERIALS AND METHODS

The slug pest, Deroceras sp. was recorded accidentally during the weekly field surveys of insect pests of vegetable crops in Kashmir Valley (India) in the year 2019. Some 6-7 samples of the slugs were collected from a vegetable farm at Serch, Ganderbal Kashmir (Latitude 34.216496 and longitude 74.771942, 1619 m above sea level) and preserved in 70% alcohol for dissection. Average day temperature in the field was around 19°C. Soils were heavy, and vegetable beds had maximized drainage and minimized water- logging. Some live samples of this slug were also taken to laboratory for rearing in plastic containers (using its host plant as food) to become sexually mature and formation of shell, which was necessary for their identification. The essential field observations, regarding the host-plants of this slug pest, nature and extent of damage, season, No. of slugs per plant etc., were recorded in field diary. Taxonomic identification of the slug under family Agriolimacidae was made according to diagnostic characteristics of genitalia and external morphology as per Wiktor [5]. Some specimens along with field photographs were sent to Suri Sehgal Center for Biodiversity and Conservation, Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore India, for identification and confirmation.

#### **3. RESULTS AND DISCUSSION**

During the present survey of insect pests, the slug of genus Deroceras was recorded as a pest of some economically important crops like beans, brassicas, turnip, sugar beet etc. (Table 1) in many vegetable farms here at Serch, Ganderbal, Kashmir (J&K) (Latitude 34.216496 and longitude 74.771942, 1619 m above sea level). The body length of captured snail was approximately 22-27 mm. The body was nearly cylindrical, posterior end abruptly widened. Skin was thin and wrinkles visible. Coloration of live slugs ranged from dark chocolate to pale coffee. The mantle length reaches almost half of the body length. Mucus secreted was exclusively colorless, watery. The sole was cream colored. On the perusal of various latest checklists of land snails from India particularly those given by Dey & Mitra [21], Ramakrishna et al. [22], Tripathi et al. [23], and after examining the distributional map, pertaining to genus Deroceras (Agriolimacidae, Gastropoda: Pulmonata), the conclusion is drawn that this genus has not earlier been reported from Kashmir region, and hence it is a new report for Kashmir region. The field details, collected observational during this investigation, pertaining to this slug pest are incorporated in Table 1. The nature and extent of damage caused to the host plants by this slug has also been highlighted through field photographs (Figs. 1-6). During this investigation, Deroceras sp. was found most active in the field during the months of July and August. The present results and field observations are

S. No. Date of collection Host plant/crop			Average slugs Nature and extent of damage per plant	
1	15-07-2019	<i>Phaseolus lunatus</i> Linn	3-4	Biting of holes in leaves. Moderate to Severe damage recorded in infested plant. Roughly about 80-90% leaf damage observed in infested plants.
2	28-7-2019	<i>Phaseolus vulgaris</i> Linn	2-3	Biting of holes in leaves. Mild to moderate damage recorded in infested plant. Roughly about 40-50% leaf damage observed in infested plants.
3	15-07-2019	Brassica oleracea Linn. varieties: acephala, gongylodes	2-3 s,	Biting of holes in leaves. Minor damage recorded in infested plant. Roughly about 5-10% leaf damage observed in infested plants.
4	28-7-2019	<i>Solanum tuberosum</i> Linn.	1-2	Biting of holes in leaves. Minor damage recorded in infested plant. Roughly about 5-10% leaf damage observed in infested plants.
5	28-07-2019	Beeta vulgaris L.	1-2	Biting of holes in leaves. Mild to moderate damage recorded in infested plant. Roughly about 10-20% leaf damage observed in infested plants.

Table 1. Field data of slug, Deroceras sp. in vegetable farms at Serch, Ganderbal, Kashmir, India



Fig. 1.

Fig. 2.



Fig. 3.



Fig. 4.







Fig. 6.



Fig. 7.

Fig. 7. Key to Figs. (1-7): -Figs. 1-4. Damage of Deroceras on Phaseolus lunatus Linn in Kashmir Fig. 5. Damage of Deroceras on Phaseolus vulgaris Linn Fig. 6. Damage of Deroceras on Brassica oleracea acephala Linn Fig. 7. Shell of captured slug. in agreement with the studies conducted by Godan [7], Port and Port [8], South [9] and Hammond [10] and McDonnell et al. [12] who have also reported genus *Deroceras* as pest of agriculturally important crops in different parts of the world.

The present preliminary observation also provides a clue that this species of genus *Deroceras* (being reported here) can either be *D. laeve* or *D. reticulum*, which are widely distributed in Himalayan region as per the studies of Wiktor et al. [5], Hlavac [19], Bossneck [16], Budha et al. [17], Dey and Mitra [21]and Sen et al. [15]. It is also suggested that there are more chances of it being *D. laeve* which might have invaded Kashmir region recently. However, these are the preliminary observations and further detailed taxonomic studies are required to be carried out in future for confirmation of this slug species.

## 4. CONCLUSION

This communication reports *Deroceros* sp. for first time from Kashmir, especially as a pest of some agriculturally important crops. It is most likely that the invasion of *D. laeve* has taken place in this region also. Here in this communication, only preliminary observations on morphology and pest status of *Deroceros* sp. have been recorded. Therefore, it is suggested that, in future, detailed taxonomic and bioecological studies of this slug are required to be carried out for complete understanding of this species in J&K.

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## **COMPETING INTERESTS**

Author has declared that no competing interests exist.

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