

Review Article

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Assessment of Integrated Pest Management against Onion Maggot in Trans Himalaya Leh

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ABSTRACT

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Cold arid zone of India lies in the high altitude ranges of north-western Himalayas in the northern most latitudes of the country covering Ladakh province of Jammu and Kashmir and Lahul-Spiti Division of Himachal Pradesh. Ladakh and Lahul-Spiti are well known by the name of cold desert region of India where agriculture season is short only for the summer months of April to September. Most of the insecticides tested under *in-vivo* conditions were found effective against *Delia antique* (Onion Maggot) which is serious insect of onion, garlic and other bulbous plants in cold arid region Ladakh. *Delia antique*, commonly known as the onion fly, is a cosmopolitan pest of crops.

Introduction

Onion (*Allium cepa*) belongs to the family Liliaceae, an important group of crops worldwide. Onion is grown in temperate, sub-tropical and tropical climate throughout the world (Brewster JL, 1990; Corgan and Kedar, 1990; Currah and Proctor, 1990). In winter when no fresh vegetables are available in Ladakh region, onion can be taken out of store houses or vegetable sellers for regular consumption or supply to the market (Ganie *et al.*, 2018). Onion maggot, *Delia antique* (Meagan), is a serious pest of onion and related *Allium* crops (i.e., garlic and leek) in temperate region throughout the world. It is

one of the major constraints for achieving higher production in onion crop in Ladakh region. Onion maggot completes three generations per year in northern region. All three generations can be destructive, but the first generation is the most damaging because it can routinely reduce plant stands by over 50 per cent if crops are not protected. In Ladakh region onion maggot are found in all major onion-growing area which causes severe damage to onion crop (Ajay and Namgyal, 2010). The onion maggot larvae attack germinating seedlings, feeding on the developing roots and epicotyls and can continue to feed on the expanding bulbs during later stages of growth. Eckenrode and

Walters in 1997 reported that the onion maggot, *Delia antiqua* (Meagan) can cause onion stand losses from 20 to 90 per cent in many temperate regions. Onion maggots are highly host-specific to plants in the onion family including onions, leeks, shallots, garlic and chives. Stunted or wilted onion plants are the first signs of onion maggot damage. Light infestations may not kill onion plants but make them more susceptible to bacterial rots.

Situational analysis and problem

Modern agriculture evolves greater use of technology and has great potential for bringing about socio-economic transformation among the farmers in rural areas. Livelihood options are shrinking in rural areas owing to specific problems and diminishing profitability in agriculture. India is the second largest producer of vegetables next only to China with an area of 7.98 million hectares and production of 129.07 million tonnes. The productivity, however, is quite low compared to many developed countries owing to dependence on traditional cultivation technologies, outbreak of pests and on vagaries of nature.

In hilly state of Jammu and Kashmir in general and district Leh in particular, a significant increase in area under vegetable

cultivation has been witnessed during the last two decades. However in recent past biotic stresses especially sucking pests maggot (*Delia antiqua*) in onion are becoming major hindrance in production of onion. Onion maggot is a serious pest of onion and related *Allium* crops in district Leh which cause severe damage to onion crop.

On-farm testing (OFT)

To address the serious problem of maggot in onion, an OFT was conducted on integrated management of maggot in onion in the micro climatic conditions of the district. On-farm trials comprising four treatments viz. Farmers Practise (No Spray), crop rotation with non-allium crops, dip onion seedlings in chloropyriphos @ 0.2 per cent before transplanting and application of carbofuran 3G 1Kg a.i/ha were conducted by KVK Leh at 5 locations consecutively for three years during 2015-16 to 2017-18. The results revealed that treatment comprising application of carbofuran 3G 1Kg a.i/ha before transplanting was significantly superior over other treatments and Farmer’s practice in terms of pest incidence and onion yield. This treatment resulted in maximum reduction in maggot incidence over control, respectively apart from increase in yield over control (Table 1).

Table.1 Performance of assessed treatments on pest incidence and yield of onion under on-farm trials in district Leh

Technological options	Percent reduction over farmer’s practice	Yield (q/ha)	Net return	B:C Ratio
T ₁ -Crop rotation with non-allium crops	31.66	170	4000	2.00
T ₂ -Dip onion seedlings in chloropyriphos @ 0.2 percent before transplanting	58.33	200	4500	2.25
T ₃ -Application of carbofuran 3G 1Kg a.i/ha	74.68	220	5000	2.50



Healthy onion crop in treated plot



Pest infestation (Maggot) in Farmers Practice



Healthy onion crop in treated plot



Onion seedlings treatment on farmer field

This treatment provided a net return of Rs. 5000 per 100 m² with BC ratio of 2.50 followed by other treatments and check.

Up-scaling of technology

After successful testing under OFTs, the treatment was up-scaled through awareness campaigns and demonstrations for wider application in the district. A total of 10 demonstrations were conducted in different areas of the district. The results revealed that this technology provided maximum higher yields than the farmer's practice. Economic analysis of demonstrated technology in comparison to farmer's practice revealed that

on an average, a net additional return of Rs. 5000 per 100 m² was obtained under the demonstrated technology which was higher than the farmer's practice.

Impact

The treatment has emerged as a better option for the onion growers of the district. With the initiative of KVK, the technology has spread to about 5 hectare area in the district resulting in additional income to the onion growers in the district. Management of maggot in onion helped in achieving higher yield per unit area and demand of onion fulfilled locally. In view of wider response, this technology has vast

potential for pest management and could be further intensified effectively in all onion growing areas in the Ladakh Region.

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