

ORIGINAL ARTICLE

Effect of Different Neem Products on the Incidence Of Cutworm, *Agrotis ipsilon* (HUFN) on Potato Crop

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ABSTRACT

Potato (*Solanum tuberosum* L) is one of the world major non-cereal food crop grown in a wide variety of soil and climates, surpassed only by wheat, rice and maize in total production. Till 16th century, it was unknown to the people of Europe, Asia, Africa and North America. Potato is a rich source of starch & sucrose. It also contains crude protein, pure protein, vitamin C, phosphorus and potassium. Potato is attacked by more than 100 arthropod pests. Of these, more than 80 have been reported in India. Out of various insect pests, potato cutworm, *Agrotis ipsilon* has been observed a very serious pest of potato in Bihar. Plant derived pesticides offer a more natural and eco-friendly approach to pest control than synthetic insecticides. Present investigation was carried out to study the effects of seven neem products viz. Neembicide, Neem gold (Karnel extract), Morgocide OK (oil), Margosa (oil), Limonool, Neem green (extract) and Azadirachtin (0.03%) oil against potato cutworm, *Agrotis ipsilon* at Muzaffarpur (Bihar). Nimbicide and Limonool were found most effective and Neem green (Extract) was found less effective to check the foliage damage. So far, as the tuber infestation is concerned, Nimbicide was found most effective as compared to other treatments of Neem products.

Keywords : Potato, Cutworm, *Agrotis ipsilon*, Infestation, Pest, Neem product

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INTRODUCTION

Potato (*Solanum tuberosum* L) is one of the world's major noncereal food crop. Detailed studies of Indian potato varieties by Pushkarnath (1976) recognized sixteen distinct locally established or desi varieties. In India, the major production area of potato (about 74%) is located in three states namely Bihar, U.P. and West Bengal. The other important states are M.P., Punjab, Assam and Karnataka. Potato is store house of energy and nutrition. It is a rich source of starch and sucrose. It also contains crude protein, pure protein, vitamin C, phosphorus and potassium. Potato is attacked by more than 100 pests of Arthropods, of these more than 80 have been reported from India. Out of various pests of potato, *Agrotis inpsilon* (potato cutworm) is very destructive in Bihar (Kumar & Tiwary, 2009 and Kumar & Trivedi, 2014). For controlling insect pests, different types of chemical pesticides have been used since a long but due to their higher dose and repeated frequency of application, every year one million people suffer from pesticide poisoning (Bami, 1997). Many neurotoxic insecticides are damaging the environment and or pose a threat to public health via food residues, ground water contamination or accidental exposure (Isman et al; 1990). Plant derived pesticides offer a more natural and ecofriendly approach to pest control than synthetic insecticides (Leatemala and Isman, 2004). Today about 200 plants with insecticidal activities are known (Singh et al. 2001). According to Harikrishnan et al (2003), among the natural products, one of the most promising natural compound is Azadirachtin, an active compound extracted from the *Azadirachta Indica* (Neem), whose antiviral, antifungal antibacterial and insecticidal properties have been known for several years. Anuradha and Annadurai (2008) reported that Azardirachtin is active in nearly 550 insect species, mostly in orders coleoptera, Diptera, Lepidoptera, orthoptera, Homoptera, Heteroptera etc. Salaka (2002) reported that the use of *Azadirachta indica* has obvious advantages which include it is relatively cheap, easily available, systemic and its complex mixture of active ingredients, which function differently on various parts of the insects life cycle and physiology and makes difficult for pests to develop resistance to it.

Present investigation was carried out in Muzaffarpur (Bihar) during the year 2013–14 to study the effects of seven neem products viz. Neembicide, Neem gold (Karnel extract), Morgocide OK (oil), Margosa (oil), Limonool, Neem green (Extract) and Azadirachtin (oil) against potato cutworm, *Agrotis ipsilon*.

MATERIALS AND METHODS

A field trial was conducted in randomized block design with eight treatments including control in the farmer's field of Muzaffarpur (Bihar) during 2013–2014. Each treatment was replicated four times. The treatments were : T1 – Neembicide, T2 – Neem gold (Karnel extract), T3 – Morgocide OK (oil), T4 – Margosa (oil), T5 – Limonool, T6 – Neem green (Extract), T7 – Azadirachtin (0.03% oil) and T8 – control (untreated). The Kufri sinduri variety of potato was planted in the first week of November, 2013 in plot size 4.25 × 4m² and spacing 60 × 20 cms. All the agronomical practices were done as per schedule. Weekly observations were recorded on the incidence of *A. ipsilon* on plant foliage. The crop was harvested in the first week of February, when potato attained full maturity. At the time of harvesting, damage of tubers due to cutworm both by number and weight basis was recorded.

RESULTS AND DISCUSSION

Results obtained are summarized in Table–1 and Figure–1. From the data of the table, it is evident that all treatments reduced the population of cutworm significantly over the untreated control. Foliage damage was recorded between 0.40 and 1.60% in different treatments as compared to 5.40% in T8 (control). T1 (Neembicide) was most effective (0.40%) followed by T5 (Limnor oil). The tuber damage (by number) varied between 0.30 and 1.00% as compared to 10.30% in T8 (control). T1 (Neem bicide) was most effective (0.30%) followed by T2 (Neem gold). The tuber damage (by weight) recorded between 0.35 and 1.10% as compared to 11.10% in T8 (control). T1 was most effective (0.35%) followed by T2 (0.5%).

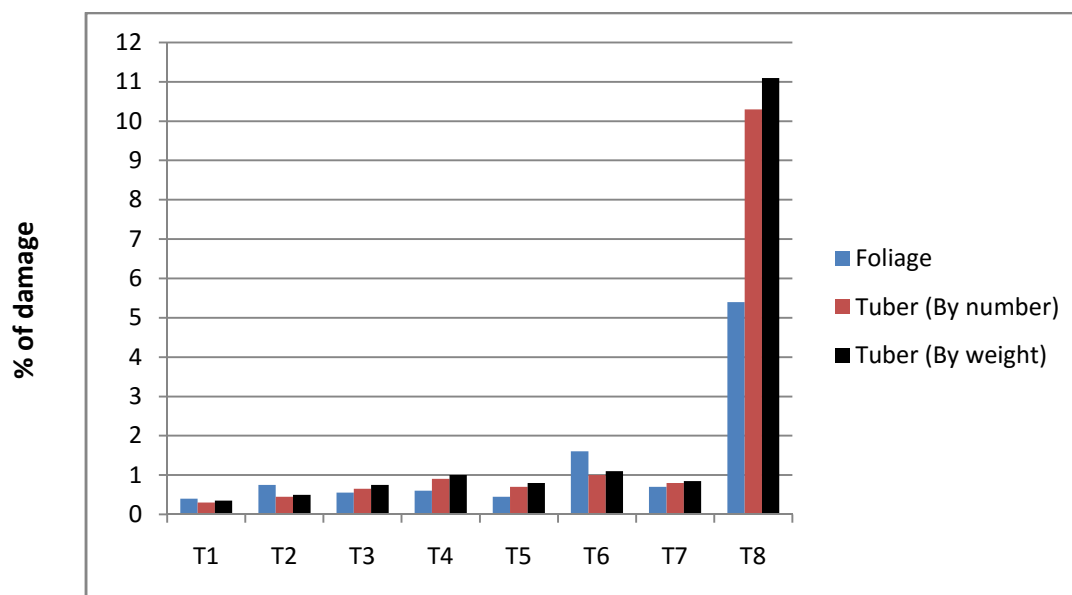
Simpson (1977) reported that more than 100 Arthropod pests damage potato crop in various parts of the world. Mishra and Agrawal (1988) have given a comprehensive list of insect and noninsect pests damaging potato in different parts of India. Kumar and Kumar (2005) reported *Agrotis ipsilon* as a serious pest of potato in Bihar. Kumar and Tiwary (2009) reported that Kufri Chandramukhi variety of potato suffered maximum foliage as well as tuber damage by *Agrotis ipsilon* in Muzaffarpur (Bihar).

According to Singh et al (2001) about 200 plants having insecticidal properties are known today Harikrishnan et al (2003) reported that among the natural products, one of the most promising natural compound is Azadirachtin, an active compound extracted from Neem, *Azadirachta indica*. Its antiviral, antifungal antibacterial and insecticidal properties have been known for several years. According to Anuradha and Annadurai (2008) Azadirachtin is active insecticide in about 550 insect species. Salaka (2002) reported that Neem was effective against various insect pests of Wheat, Barley, Paddy, Sugarcane, Tomatoes, Cotton etc. According to Shanmugapriyan and Dhanlakshmi (2015), Neem cake extract, Neem seed Kernel extract and Neem oil were effective against the insect pest *Henosepilachna vigintioctopunctata* on bitter gourd. Radha (2013) reported that higher concentration of neem seed Kernel extract (6.0%) reduced the percentage of the adult emergence of Cowpea Aphid, *Aphis craccivora* (Koch). Bairwa et al. (2015) reported that Neem seed Kernel extract and Nimbecide were effective against thrips on mothbean, *Vigna aconitifolia*.

Table–1: Effect of different Neem products on the incidence of cutworm, *Agrotis ipsilon* HUFN on potato crop

Treatments	Dosage	Average % foliage damage	Average % Tuber damage	
			By number	By weight
T1 – Neembicide	300 ppm Aza	0.40	0.30	0.35
T2 – Neemgold (Karnel extract)	1500 ppm Aza	0.75	0.45	0.50
T3 – Morgocide OK (oil)	300 ppm Aza	0.55	0.65	0.75
T4 – Morgosa (oil)	300 ppm Aza	0.60	0.90	1.00
T5 – Limonool	300 ppm Aza	0.45	0.70	0.80
T6 – Neem green (Extract)	1500 ppm Aza	1.60	1.00	1.10
T7 – Azadirachtin (0.03%) oil	300 ppm Aza	0.70	0.80	0.85
T8 – control (untreated)	–	5.40	10.30	11.10

ppm – parts per million
Aza = Azadirachtin

FIGURE-1: Efficacy of different Neem products on the incidence of cutworm, *Agrotis ipsilon* HUFN on potato crop

T1 – Neembicide

T2 – Neemgold (Karnel extract)

T3 – Morgocide OK (oil)

T4 – Morgosa (oil)

T5 – Limonool

T6 – Neem green (Extract)

T7 – Azadirachtin (oil)

T8 – Control

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