INTRODUCTION

Agriculture occupies an important position around the world in which numbers of vegetables are grown. Onion, *Allium cepa* has its own importance and it comes in the list of most consumable vegetables. The generic name *Allium cepa* is derived from Latin in which *cepa* means onion. The genus *Allium* is coming in the class Monocotyledon; order Asparagales; family Alliaceae that includes the various economically important and cultivated species like onion, garlic, scallion, shallot and leek as well as chives and such other species.

Onion is the most popular bulb crop which is widely cultivated in hundreds of varieties around the world in about 20 lakh hectares (Parmar et al., 2010). It is second most valuable vegetable as well as commercial crop approximately 170 countries cultivated onion for domestic use as well as in export markets in which India, China, Africa, Asia, Europe, and America are the largest producers. India comes on the second position in production of onion and it is grown in area of 10.15 lakh ha with a production of 247.63 lakh metric tons and productivity of 24.39 t/ha (Mallinath et al., 2014). It is widely cultivated in different parts of the country like in Maharashtra, Uttar Pradesh, Bihar, Andhra Pradesh, Karnataka, Gujarat, Rajasthan, Tamil Nadu and Haryana.

Onion, *Allium cepa* is a primary vegetable of routine food, for rich and poor families its importance is well known. It is mainly chopped as well as used as an ingredient in different types of dishes and sometimes also used as main ingredient in their own right like in soup and chutney. Onion is very versatile and can be baked, boiled, grilled, fried, roasted, sautéed, or even eaten as raw in salads and also used as a thickening agent for curries and gravies. Onions pickled in vinegar eaten as snack. Consumption of onion has been increasing significantly day by day because of the health benefits which they possess. It is mainly rich in Vitamin A, B6 and C along with minerals like Potassium, Selenium, Calcium, Magnesium, Phosphorus, Sodium, Zinc, Fluoride and Polysaccharides. Onions are sodium, fat and cholesterol free and provide a number of other nutrients like protein, dietary fiber, sugars, calories and carbohydrate (NOA, 2011). And it is also used for some medicinal aspects because it is rich in antioxidant thought to prevent cancer, diabetes, even in common cold etc. Onions also have flavonoids and alkenyl cysteine sulphotide which plays a part in preventing heart diseases and other ailments in humans. Certain types of chemical substances are also contained which cause irritation in eyes during cut the onion. Dry onion is the most important source in the local market and also an important source of income for farmers and business communities who involved in local and cross border trade. The local
production of onion is sufficient for the country’s needs, although off-season shortages occur. Such shortages are mainly due to the lack of appropriate pest management techniques, lack of marketing strategies, poor storage and inadequate post-harvest technology. Due to lack appropriate pest management techniques the productivity of onion decreased in huge amount which cause shortage even during the season of onion. The low productivity can be attributed to several factors i.e. quality of seed, growing methods or adoption of appropriate plant protection measures and one of the important factors for low yield of onion was attributed to infestation by onion thrips.

Onion thrips, *Thrips tabaci* (Thysanoptera: Thripidae) are a polyphagous as well as cosmopolitan pest that causes serious damage on vegetables and ornamentals all over the world. It is important as a pest on Alliaceae plants such as onions (*Allium cepa*) and leek (*Allium porrum*), as well as on cultivated crop of Brassicaceae plants like radish, cabbage and cauliflower. It is considered as direct as well as an indirect pest of onion bulb because it feed on leaves rather than bulb. Both adult and nymph cause damage direct by feeding and indirectly through the transmission of lethal plant viruses (*Pandey et al.*, 2014). Thrips possesses piercing and sucking mouth parts only left mandible present by which, it can feed on leaves and other tissues of the onion crop and causes silvery leaf spots that turns into white blotches along the leaves followed by the development of silvery patches and curling of leaves. This injury reduces the photosynthetic ability of the plant by destroying chlorophyll rich leaves mesophyll which may interfere with transportation of nutrients to the bulb and result in reduction of onion bulb weight and yield loss from 50% to 60%. (*Diaz-Montano et al.*, 2012).

The management of thrips pest is very problematic due to their minute size (1.5mm long) and their cryptic habits, as they feed in hidden in crevices of flowers and leaf sheaths. Their high reproductive capacity leads quickly to great numbers infesting to individual plants (*Ahmed et al.*, 2011). Stages in the developmental cycle of thrips are the eggs; first larval stage, second larval stage, prepupa, pupa and adult. Because of their small size it is not easy to identify the species even with a hand lens. Adult specimens are usually needed to make species identification under high microscope magnification. The entire life cycle (egg to adult) requires about 19 days large population are able to develop quickly under Indian weather conditions where there are many over lapping generation throughout the year. Reproduction of this species is mostly through a process called parthenogenesis in which females are able to reproduce without mating. As a result, population consists of females are more than male. Adult thrips about 0.06 inches (1.5mm) long, elongated and have yellow and brown body with two pairs of fringed (hairy) wings. Males are wingless and exceedingly
rare. Females live for about 2-3 weeks and each can lay about 80 eggs. Eggs are generally white to yellow; Kidney bean shaped; approximately 1/125 inches in length, hatch in 5-10 days (Diane et al., March 2008). Larva in two stages feeding and non feeding. Instars I and II (0.02 to 0.04 inches; 0.5 to 1mm in length) are active and feeding stage. Instars III and IV (0.04-0.05inches; 1.0-1.2mm long) are inactive and non feeding stages; also called pre-pupa and pupa. They are pale yellow to brown; body more stout than younger instars, antennae are bend to head; wing buds are visible, generally found in soil, at the base of the onion plant neck or underneath bulb scales, development completed in 4 to 7 days (Diane et al., 2008).

Due to rapidly increase in the population of thrips the damage on the onion crop also increased which reduces in large amount of quality as well as in the quantity of onion and other crops. To control the huge losses of such crops normally the farmers use various types of insecticides in high proportion. The excessive use of these insecticides leads to the development of undesirable problems like destruction of natural enemies and pest resurgence (Tatagar et al., 2011). These insecticides can easily destroy the insect pests but they are hazardous to our health, environment and biodiversity and also develop carcinogenic diseases.

Onion thrips, Thrips tabaci can also be controlled in ecofriendly manner by using their predators and parasitoids. Normally, insect predators and parasitoids can be found in almost all agricultural and natural habitats. The use of predators and parasitoids to control the effectiveness of thrips will promote national interest as the better growth of crops by minimizing the harm by thrips. The farmers dependent on the proposed crops will get better yield. Biological control is a sub discipline of applied ecology.

To adequately practice it, one should have a firm understanding of population and behavioral ecology. Without systematic and proper identification of pests and their associated natural enemies, biological control as science would fail to function. In this course the biological control of weeds, factors limiting parasitism, environmental concerns relative to biological control, augmentation of natural enemies etc. will be addressed over the research tenure. This research will give a non toxic ecofriendly, biological control technology of onion thrips, Thrips tabaci for incensement of production for onion, Allium cepa with the help of biological agents like predators and parasitoids. So the significance of this research in favor of agriculture system and we will be able to provide best tools and strategies to the farmers for an effective management of pest insect.
Finally biological pest management became increasingly important as public opinion is in favor of reduced pesticide application and environmentally