

The Effects of Transplanting Date on Management of Tobacco Insect Pests: Min Review

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Abstract

The main review purpose this paper provides updated information on the effect of different transplanting dates on the infestation of tobacco insect pests were carried out at different areas by different investigators. The results different trials conducted in different agro ecological zone revealed that the damage was higher and yield decrease were recorded in late transplanted tobacco and the damage was gradually yield increase in early transplanted tobacco in season. Several species of insects cause serious damage to tobacco in the field, the greenhouse and in storage. Insects damage the roots, destroy the leaves and buds and reduce leaf quality. Others transmit several important tobacco disease pathogens. Management systems for flue cured tobacco (*Nicotiana tabacum* L.) insect pest involving variations in different planting date were compared to evaluate their influence on insect pests' damage, yield and quality of flue cured tobacco. The results indicated that early transplanted significantly increase leaf yield, growth parameters and decrease insect pest damage incidence. The study indicated that transplanted has pronounced positive effect on management of tobacco insect pests and growth of tobacco.

Keywords: Tobacco (flue-cured); Transplanting date; Green leaf yield; Insect damage; Ecological zone

Introduction

Tobacco is an herbaceous annual or perennial plant in the family Solanaceae grown for its leaves grown economically significant agricultural crops in the world. The crop has a thick, hairy stem and large, simple leaves which are oval in shape, produces white, cream, pink or red flowers which grow in large clusters. Tobacco is a stimulant and the dried leaves of the tobacco plant can be cured and used to produce tobacco cigarettes, cigars and snuff or for pesticide production. Tobacco grows very well in a wide range of climates, it is a drought tolerant, hardy and short duration crop which can be grown on soils where other crops cannot be cultivated profitably. The type of soil depends on the variety of tobacco being grown but the best yields are usually obtained in loam to sandy loam soils. Tobacco plants are easily damaged by waterlogged soils and quality can be affected by high salinity. Plants should therefore be grown in a well-draining and well aerated soil [1].

Tobacco is one of the basic agricultural products, in Ethiopia, with social and economic importance and grown for commercial purposes by state owned farms and by farmers around these farms. The National Tobacco Enterprise (NTE) has been given the mandate to organize tobacco production and processing in the country. Tobacco is most important crop grown as part of a cropping system and contributes to a diverse income source, and improves the welfare of growers in Southern Ethiopia (Walitit and Hawassa) and Shewa Robit North Shewa Amhara regional state. In tobacco growing areas in Ethiopia at small holder and the enterprise field tobacco leaf yield, quality and production remains low always under pressure of several constraints. A key constraint which is reflected in high tobacco production is the well understanding of early crop establishment factors. Among these, the time of transplanting date is of great significance which determine ultimately effect on the yield and growth. Hence, the crop health yield and quality leaves of tobacco depend on improvement of cultural management like adjusting time of time of transplanting is essential agronomic practices [2-4].

Tobacco seedlings can be transplanted after 3-4 weeks. Transplanting tobacco plant bare root (without soil) directly from the seedling pot to the land is an easier method, as it only involves one transplant. However, once the seedlings are planted into the soil they can go into a transplant shock. Several biotic and abiotic factors limit tobacco leaf yields. They include adverse climate and soils, insects and diseases and other factors such as weeds, rodents etc. Several species of insects that poses serious threats to tobacco in the field, greenhouses and insects damages the roots, destroy the leaves and buds, reduce leaf quality and transmit several important tobacco diseases.

Tobacco is attacked by many insect pests both in nursery and main field. These pests and disease caused considerable damage to seedlings in the nursery and leaf in the transplanted crop reducing yield and quality of crop. The major pests that infest tobacco in the nursery and field are: Leaf eating caterpillar, *Spodoptera litura*; whitefly, *Bemisia tabaci*; stem borer, *Scrobipalpa heliopa* in the nursery and field crop; ground beetles, *Mesomorphus villiger*; tobacco bud worm, *Helicoverpa armigera* and Tobacco aphid, *Myzus nicotianae* in the field crop, while cigarette beetle, *Lasioderma serricorne* is a pest of stored tobacco. Apart from these, minor pests like ants, mole crickets and rove beetles, earthworms and grasshoppers occur in the nursery and stink bug, *Nazara viridula* occurs in the field

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crop. It is roughly estimated that about 34% loss of cured leaf can be avoided by adopting appropriate pest management practices [5,6].

A combination of cultural practices like early planting, synchronous planting, crop rotation and early maturing varieties protect the tobacco crop against most insect pests and disease. The early sowing might get an advantage of the earlier moisture for emergence and might escape from infestation of the pest. Several research outcomes witnessed that adjusting time of planting often helps crops to escape the vulnerable crop stage from an insect pest and also to harvest better grain yield [7]. The Integrated Pest Management (IPM) system is important in combining cultural, natural, and chemical controls in order to maintain insect pest population and promote the use of insecticides only when necessary [8].

Moreover, among the different factors, weather parameters play a significant role in tobacco production. Weather conditions influence the various growth and development stages of a crop and indirectly, the incidence of pests and diseases. An attempt was made in this study to find out the influence of date of transplanting on the insect pests' incidence in tobacco that convey the management strategy of tobacco insect pests. Hence, keeping the above concept in view, therefore, in this review attempted made to evaluate the effectiveness of different transplanting dates for the management of tobacco and others crop pests in different region.

Literature Review

Methodology

As a methodology the main source for this systematic literature reviews were different publication journal publication year 1966-2023. Different journal articles used to review from these peer reviewed data. Through searching results 59 papers were retrieved and by reading abstract, key work and conclusion parts of this paper were identified that meet the objective of this report. Then, country of origin, year of publication, publisher, journal name, focus areas of the paper, methodology and findings of the paper were considered and analyzed.

Research result on effect of planting dates for control of insect pests of different crops

Several studies have also been reported in the literature indicated that adjusting planting dates of cabbage can sometimes help to avoid certain insect infestations and reduce the need for chemical control [9]. Study has also been carried out in Karnataka the effect of planting date of cabbage on the extent of damage by *P. xylostella* by Viraktamath, et al. observed highest per cent leaf damage (98.83) in the crop planted in the 1st week of January followed by the crop planted in the 1st week of December (48.18) and no heads were marketable in either case [10]. However, the lowest rate of leaf damage (16.87%) and highest average yield per plot (12.2 kg) were recorded in the crop planted in the 1st week of October.

Planting date is a good candidate as a management tool for thrips because the window of susceptibility of cotton to thrips is only a few days long under favorable conditions for cotton growth. Authors have noted the use of planting date as a cultural practice that is potentially useful to avoid peak populations of thrips [11,12]. In a study in Texas, cotton planted in late June had lower numbers of thrips infestations compared with cotton planted in April. In another study, thrips were

more prevalent in cotton planted timely (second week of May) than in late-planted (second week of June) cotton, but the findings did not indicate whether the thrips infestations resulted in damage or yield loss. Although previous studies have examined the potential of different planting dates to manage thrips in cotton, a study with a greater resolution and range of planting dates compared with the two and three planting dates used in previous studies is needed to provide more information on the potential for different planting dates to manage thrips in cotton.

An experiment was carried out at the Bangladesh Institute of Nuclear Agriculture (BINA), Mymensingh, Bangladesh in order to investigate the effects of rice variety and planting date on the incidence of insect pests and natural enemies result indicate that occurrence of insect pests and their natural enemies on rice is influenced by variety and date of planting [13]. Similar findings of reduced pests and diseases in early maturing variety and early transplanting date have been reported by Litsinger, et al. moreover low incidence of pest and diseases in early planting rice is also reported by Moniperumal, et al. [14,15]. In early transplanted crop when the infection stage of pest and microbes are over, the inoculums would be finding a place in a late transplanting crop [16]. In the case of late transplanting the surrounding crop might have completed their susceptible growth stages and the entire pest inoculums would be feeding or confining to the late transplanted crop. This might be the reason for higher insect pests' incidence for delayed transplanting. Varying the planting time of crops works as a means of cultural control by creating asynchrony between crop phenology and insect pests' phenology which can retard the colonization [17].

Effect of date of transplanting on the incidence of Green Leaf Hopper (GLH), *Nephotettix virescens* (Distant) and *N. nigropictus* (Stal) in rice field, Jharkhand experiment conducted by Munna Yadav, et al., results revealed that the appropriate transplanting dates may influence green leaf hoppers from these experimental results, it may be concluded that the 1st transplanting date (1st July) can minimize green leaf hopper attack. Therefore, in Jharkhand, a thorough study on rice, the early transplanting time is very essential for building up a successful pest management system. The finding of the present field studies was found to be in accordance with the results of Prasad and Prasad, Kumar and Prasad and anonymous [18-22].

The effect of three dates of planting viz. 1st November, 15th November and 30th November on pest and leaf curl virus incidence of bell pepper var Indra was studied in a farmer's field at North 24 Parganas district in West Bengal for two consecutive seasons (2015-2016 and 2016-2017) result concluded that 1st November planted crop reveals in lower incidence of aphids, thrips, whitefly and fruit borer and leaf curl virus except mites. Such low level of insect pest caused a less crop injury which resulted in enhancing the yield of bell pepper. Pest and leaf curl virus incidence was moderate on 15th November planted crop. Therefore, planting of bell pepper should be completed within 1st week of November in Southern district of Bengal basin with proper protective measure against yellow mite during seedling and early vegetative growth stage [23].

The sowing date and planting stage of maize are among the most important factors that affect infestation levels of thrips, aphids and stem borers, which in turn affect the percent of yield losses. The results suggest by Hamdy, et al., that the percentage of thrip, aphid and stem borer infestations can be minimized by planting maize varieties in June. Moreover, we conclude that the three insect pests were significantly correlated with their associated predators, which could be

utilized to minimize pest insect populations in maize ecosystem. This result in agreement with results of Mohamed, et al., who studied the effects of four squash seed planting dates in April and May [24]. Furthermore, Beres, et al. reported that when sweet corn was sown in the last week of April, thrips began infesting the corn plants from the first or second week of May with large populations observed in the second week of July [25]. Kerns, et al. also reported that the lowest population size of thrips occurred when cotton was planted after May 15 rather than in April or June [26].

Muhammad, et al. investigations made on insect and mite pests were carried out from the beginning of chili growth period till the crop maturity, at Kunari, district Mirpur Khas conducted indicated five study insect pests including aphids (*Aphis gossypii* Glover), thrips (*Scirtothrips dorsalis* Hood), mites (*Polyphaga gotarsonemus latus* Banks) whiteflies (*Bemisia tabaci* Genn) and fruit borer (*Helicoverpa armigera* (Hubner) were monitored and the effect of plant dating was investigated on chilli green pod production. As reported by Berke and Sheih, et al., that one of the practical means of increasing chilli production is to minimize losses caused by major sucking pests, the most important among them are green peach aphid (*Myzys persicae* Sulzer, *Aphis gossypii* Glover), thrips (*Scirtothrips dorsalis* Hood) and yellow mite (*Polyphagotarsonemus latus* Banks) [27]. The yield losses due to these pests are estimated to be 50 per cent [28,29]. The loss caused by the thrips is reported to range from 50 to 90 percent and a fruit borer is to an extent of 90 percent [30].

Discussion

Research result on effect of different transplanting dates for control of tobacco pests

Tobacco is attacked by variety of soil, foliar and stored tobacco insect pests can attack tobacco from transplant through harvest through the world [31]. Hornworms and budworms reduce yields by feeding directly on plant leaves. Aphid cause indirect losses; their feeding reduces plant vigor, they may spread viruses and sooty mold produced when large populations of aphids are present reduces tobacco quality. Flea beetles cause stress when feeding on young plants and directly damage harvestable leaf when feeding on mature plants. Tobacco insect pests are active at predictable times during the growing season flea beetle infested tobacco 1 week after transplanted until harvest, horn worms started 3 weeks after transplanted until topping, *Aphid* and bud worms at 3 weeks after transplanted and cut worms 1-4 weeks after transplanted. Timely field checks and use of treatment guidelines will allow early detection and assessment of problems, so sound pest management decisions can be made [32].

Cultural control consists of utilizing alternative crop rotation, proper sanitation of fields, tillage, trap cropping, alternative planting dates, and host plant resistance to limit damage to crops or reduce pest populations. Other examples of successful cultural control of insects are numerous [33]. McPherson, et al., conducted field trial in 1987-1989 to study the influence of transplanting dates on tobacco budworms threshold density indicated that tobacco budworms population density of less than one per 20 plants in the early transplanted tobacco (late march) while late transplanted (late April) tobacco budworms threshold levels (1,2,4, or 8) budworms per 20 plants significantly affected affect tobacco quality, yield and budworm damage [34].

Different strategies have to be involved for keeping the pest in check and stabilizing the productivity of the cropping system. Date of planting is one of the crop habitat diversifications that are to be looked into, to minimize the incidence of insect pests on tobacco so that it can be enhanced yield. Response to planting date is highly dependent upon the growing season. For example, increases in temperature and Photosynthetically Active Radiation (PAR) that has been observed in late planted tobacco compared to tobacco planted at the normal timing may cause more rapid growth, hasten floral initiation, produce thinner leaves, and possibly hasten senescence and reduce yields [35]. Late planted tobacco is also at greater risk from leaf diseases such as brown spot caused by *Alternaria*, weather damage, and damage from insects such as budworms and aphids [36].

Aphid abundance was significantly lower in transplanting tobacco 10 days after garlic transplantation at a density of 5.85 individual plants per square meter than in the other treatments. The ratio between enemies and pests in transplanting tobacco 10 days after garlic transplantation at a density of 5.85 individual plants per square meter was higher than those in the other treatments showed experiment conducted in Liancheng County in Longyan City, Fujian Province, in China in 2014 and 2015 by Lai et al., on *Thrips tabaci* infestation and found that thrips infestation increased significantly when the planting date was delayed [37-39].

Conclusion

The review articles concluded that the need for demonstrations on the use early transplanting dates of effective insect pests control methods and all found effective in management of pests in agriculture they need to be validated scientifically.

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