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Effect of fermented wild plant leaf extract on crop growth and productivity of Tomato *(Lycopersicon esculentum* L)"

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ABSTRACT

Twelve different wild plant leaves were collected ie *Azadirachta indica,Annona squamosa Gnidia glauca (Fres.) Gilg,Ricinus communis , Cascabela thevetia,Clitoria ternatea, Ailanthus excels ,Parthenium hysterophorus, Calotropis procera,Vachellia leucophloea,*Gelshendi were selected and all collected plant Leaves s o a k e d in 250 liters of water and 25 to 30 liters of cow urine was added along with 10 gm dried tobacco leaves were added to prevent insects as well as 2 to 3 kg of lime was added then all the mixture kept for fermentation for 2 months and after 15 days of time interval the spraying of formulation was given with seven different concentrations (10%, 20%, 40%, 60%, 80% and , 100%) including control. In this present investigation it was found that highest Average plant height (78.9cm) was recorded in theT4 (40% conc.),Average number of branches(24.3) , Average number of Leaves(197.6), Average number of flower bud (10.3), Average number of fruits(19) and Average number of fruits(483.3)followed by T5 (60% conc.) Average plant height (77.9) , Average number of branches(22.6), Average number of Leaves(185.6) Average number of flower bud (11) , Average weight of fruits(16.3 gm.) and Average number of fruits(413gm)

INTRODUCTION

Tomato, (*Lycopersicum esculentum* L.) belongs to the Family Solaneceae and genus Solanum is one of the Most important and popular vegetables after potato in Bangladesh. Tomato is mainly grown during rabi Season but some varieties are also cultivate in summer Season in Bangladesh. It is grown worldwide either in The field, green houses or net houses. It is one of the Most important protective crops. Tomato provides an Excellent amount of vitamin C, mineral manganese and vitamin E. Moreover, lycopene in tomato is a Powerful anti- oxidant and reduces the risk of prostate Cancer (Hossain et al., 2004). Among the winter Vegetable crops grown in Bangladesh, tomato ranks fourth in respect of production and third in respect of Areas (Anonymous, 1999). Tomato is cultivated in an Area of 23886.63 hectares with total production of 190 thousand tons and average productivity of 32.20 ton Per acre (BBS, 2012).A huge number of insect pests are reported to ravage the tomato fields and among them, tomato fruit borers (TFB) are of much significance and causes extensive damage to fruits. Among fruit borers, Helicoverpa Armigera (Hubner) is responsible for considerable Losses in quantity as well as quality of tomato fruits (Meena and Raju, 2015).H. armigera is a cosmopolitan and ployphagous insect Pest that causes a yield loss up to 70% (Dhandapaniee Al., 2003). Most of the tomato growers of our country are exclusively rely on different Chemical/conventional insecticides to control H. armigera and many sucking insect pests. Tomato Being a vegetable crop, use of conventional Insecticides leaves considerable toxic residues on tomato fruits which causes serious health hazards. In Addition, indiscriminate uses of various synthetic Insecticides adversely affect the population of nature Enemies i.e. predators, parasitoids and pathogens in Tomato ecosystem (Mossa et al., 2018). To combat Such adverse effects from insecticides uses, in recent Years, farmers are encouraged to apply different Biorational insecticides which pretend to be more target specific and safer for natural enemies as well as Environment's (Chakrabarty and Sarker, 2011; Isla Et al., 2016). In the search for safer insecticides technologies, i.e. More selective mode of action and reduced risks for Non-target organisms and the environment, progress Has been made in the last few years for the Development of natural and synthetic compound through fermentation of soil bacteria viz. Streptomyces, Saccharopolyspora etc. capable of Controlling insects potentially without interfering the Biodiversity of beneficial arthropods. Emamecti Benzoate and Abamectins are two bacterial ferment Biopesticides derived from soil bacteria, Streptomyces Avermitilis and widely used for controlling different Sucking and borer insects as well as mites (Mossaee Al., 2018).

In addition, Spinosad, a derivative of the Soil actinomycete (Saccharopolyspora spinosa), is the Most widely used biorational pesticide against Different vegetables like tomato, brinjal, bean etc. Many laboratory and field investigations were made to Ascertain the effect of biorational pesticides on the Abundances of beneficial arthropods like lladybir Beetle, carabid beetle, murid bugs, spiders etc. (Gavle et al., 2005; Ahmed et al., 2015) however the safety of Soil fermented biopesticides to the predatory Arthropods in tomato ecosystem are scantly Investigated. In the present study, the compatibility of Three bacterial fermented biopesticides viz. Suspend 5 SG (Emamectin Benzoate), Ambush 1.8 EC (Abamectin) and Tracer

45 SC (Spinosad) with three Prevailing predators namely ladybird beetle, carabid Beetle and, lynx spiders was evaluated in a tomato Ecosystem. Allthese predators are highly efficacious For predating whitefly, aphid, jassids etc. and play.Significant role in biological control approach (Koch,2003;Rajeswaran et al., 2005). Therefore, the present Study was undertaken to find out the compatibility of Selected biopesticides with different predatory Arthropods in tomato ecosystem.

Therefore in the present investigation efforts were made to formulate wild plant leaf extract which can be used as a pesticide, insecticide and also enhance growth and productivity.

Materials and Methods:

Twelve different wild plant leaves were collected ie *Azadirachta indica,Annona squamosa Gnidia glauca (Fres.) Gilg,Ricinus communis , Cascabela thevetia,Clitoria ternatea, Ailanthus excels ,Parthenium hysterophorus, Calotropis procera,Vachellia leucophloea,Gelshendi* all collected plant Leaves soaked in 250 liters of water and 25 to 30 liters of cow urine was added along with 10 gm dried tobacco leaves were added to prevent insects as well as 2 to 3 kg of lime was added then all the mixture kept for fermentation for 2 months along with stirring at morning, afternoon and evening. The filtrate was collected then in the 250 liters of filtrate 250 liters of water was added. Virangvariety of tomato was selected The plant lets were planted and after 15 days of time interval the spraying of formulation was given with seven different concentrations (10%, 20%, 40%, 60%, 80% and , 100%) including control. and the observations were recorded.

Results and Discussion:

Table no. 1 -: Effect of fermented wild leaf extract on Growth (after 15 days)

Treatment	Average Height (cm)	Average No. Of branches	Averag No. Ofleaves
T1	21.8	5	24.3
T2	21.5	5.6	26.3
T3	20.5	5.2	25.6
T4	20.7	5.6	27.6
T5	21.3	5.8	28.3
T6	18.3	5	29.6
T7	21.5	6.1	29.9

Note:-T1=Control ,T2=10% ,T3=20%conc ,T4=40% conc. ,T5=60% conc., T6 =80% conc., T7 = 100% conc.

Result summarized in the table no.2 it was proved that highest Average plant height (21.5cm)was recorded in theT7(100% conc.),Average number of branches(6.1) ,and Average number of Leaves(29.9) followed by T5(60% conc.) Average plant height (21.3) , Average number of branches(5.8) and Average number of Leaves(28.3)

Table no. 2-: Effect of fermented wild leaf extract on Growth **(After 30days)**

Treatment	Average Plant Height (cm)	Average Number Of branches	Average Number Ofleaves
T1	42.6	13	134.6
T2	45.43	14.66	157.3
T3	48.1	14.33	134
T4	48.6	15.33	174
T5	45.76	10.66	133.6
T6	36.1	11.33	129
T7	37.1	12.33	148

Result summarized in the table no.2 it was proved that highest Average plant height (48.6 cm)was recorded in theT4(40% conc.),Average number of branches(15.33) ,and Average number of Leaves(174) followed by T5(60% conc.) Average plant height (45.76) , Average number of branches(10.66) and Average number of Leaves(133.6)

Table No.3: Effect of fermented wild leaf extract on amount of chlorophyll after 30 Days

Treatment	Absorbance at 663 nm	Absorbance at 645 nm	Total chlorophyll Mg/gm of tissue
T1	0.316	0.607	17.07
T2	0.504	0.653	32.49
T3	0.557	0.608	33.02
T4	0.508	0.831	30.42
T5	0.506	1.061	28.23
T6	0.502	0.775	27.25
T7	0.548	1.086	29.33

Result summarized in the table no.3 revealed that highest amount of chlorophyll recorded in T3 (60% conc.ie 33.02mg/gm of tissue) followed by T7 (100% conc.ie. 29.33 mg/gm of tissue)

Observation table no. 4-: Effect of fermented wild leaf extract on Growth and productivity after 45days

Treatment	**Average** Height(cm)	**Average** Number Of branches	**Average** Number Ofleaves	**Average** Number Of buds	**Averag e** Number Of fruits
T1	63.7	28.6	156.6	18.6	3.6
T2	64.4	24.66	182	14.3	5.3
T3	63.33	21	157.3	16	5
T4	65.8	21	182.6	23	6.3
T5	65.5	17.6	156.3	18	5.7
T6	68.6	19	156.3	21	6.6
T7	66.9	20.6	184	13.3	4.6

Result summarized in the table no.4 it was proved that highest Average plant height (68.6 cm)was recorded in theT6 (80% conc.),Average number of branches(19) , Average number of Leaves(156.3), Average number of flower bud (21)and Average number of fruits(6.6) followed by T4 (40% conc.) Average plant height (65.8) , Average number of branches(17.6), Average number of Leaves(156.3) Average number of flower bud (18) and Average number of fruits(6.3)

Observation table no. 5 -: **Effect of fermented wild leaf extract on Growth and productivity** after 60 **days**

Treatment	Average Height(cm)	Average Number Of branch	Average Number Of leaves	Average Number Of flowers	Average Number Of fruits	Average Weight Of fruits (gm)
T1	79.23	35	204.6	10.3	16	340
T2	72.2	27.6	201	10	13.6	**372.3**
T3	77.9	24	161.6	14.3	17.6	293.3
T4	78.9	24.3	197.6	10.3	19	440
T5	77.9	22.6	185.6	11	15.6	**483.3**
T6	76.2	24.6	175.3	15	16.3	373.3
T7	78.6	26	208	9.3	13	**413**

Result summarized in the table no.5 it was proved that highest Average plant height (78.9cm) was recorded in theT4 (40% conc.),Average number of branches(24.3) , Average number of Leaves(197.6), Average number of flower bud (10.3), Average number of fruits(19) and Average number of fruits(483.3)followed by T5 (60% conc.) Average plant height (77.9) , Average number of branches(22.6), Average number of Leaves(185.6) Average number of flower bud (11) , Average weight of fruits(16.3 gm.) and Average number of fruits(413gm)

CONCLUSION

From the result there is a urgent need to investigate the chemical constitution of the plant extracts to determine any

synergetic effect of these chemicals and their potential in changing the biochemical and physiological structure of selected plant

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