RESEARCH ARTICLE

EFFECT OF THRIPS POPULATION ON MANAGEMENT OF BUD NECROSIS VIRUS INFECTING TOMATO *LYCOPERSICON ESCULTENTUM* MILL IN ANDHRA PRADESH

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Abstract: The closer the spacing resulted the lower was the thrips incidence. The thrips population was increased from 30 DAP to 50 DAP and then declined from 60 DAP. The thrips population was lowest in early planted crop and highest in late planted crop and medium in normal planted crop in *kharif* and *Rabi* seasons. The thrips population was highest in *kharif* followed by *Rabi* season. The thrips populations has a significant relationship with the stage of the crop.

Keywords: Bud necrosis virus, Tomato, Thrips population, Cultural practices

INTRODUCTION

In Andhra Pradesh, tomato is grown very extensively in Chittoor district followed by Kurnool. Major markets for tomato export are located at Madanapalli and Palamaneru in Chittoor district and Aluru, Aspari, Pyapili and Pattikonda in Kurnool district. The most important tospo virus infecting tomato include tomato spotted wilt virus (TSWV) in USA, Spain, Taiwan and Argentina and peanut bud necrosis virus (GBNV) in India. GBNV seems to be endemic in India and its host range indicates that legumes and other hosts play a major role in disease occurrence (Ghanekar *et al.*, 1979; Singh and Krishna Reddy, 1996). Tomato spotted wilt virus (TSWV) was reported to occur as early as 1919 in Australia. Its occurrence in India was first reported by Todd *et al.*, (1975) from Nilgiris. Of several viral diseases attacking tomato bud necrosis disease caused by Groundnut bud necrosis virus (GBNV) transmitted by *Thrips palmi* (karmy) in a propagative manner was considered to be a major threat and caused chlorotic and necrotic symptoms. The management of the disease emphasizes phytosanitary and agronomic measures that limits potentials sources of virus infection, uses chemical control measures against thrips.(Coutts & Jones, 2005). The disease development , thrips population and yield of tomato were influenced by different cropping systems (Ramkat *et al* 2008).

METHODOLOGY

Interaction of time of planting, different spacing levels and different doses of nitrogen fertilizer application as major factors. The most susceptible cultivar Meghana was planted in a plot size of 4.2 x 3.6M and replicated thrice. In 27 combinations are D1: Early planting: June 1 (*kharif*) and September 1 (*rabi*); D2: Normal planting: July 1 (*kharif*) and October 1 (*rabi*); D3: Late planting: August 1 *(kharif*) and November 1 (*rabi*); S1: Closer spacing: 60 x 30cm; S2: Normal spacing: 60 x45cm; S3: Wider spacing: 60 x60cm; N1: Lower dose of N-application: 100kg/ha; N2: Medium dose of N-application: 150kg/ha; N3: Higher dose of N-application: 200kg/ha.

Out of 27 combinations of treatments included in the first phase of experiment, two best combinations were chosen to include in the second phase of experiment along The trail was conducted in two phases during *Kharif* and *Rabi* in a factorial RBD with with barrier crop, seed treatment coupled with spray application. The thrips population was recorded at 30 DAP

RESULT

Phase –I: *Kharif, 2009*

Thrips population

At 30 DAP, in normal planted July 1st crop, the minimum thrips population 12.48, 14.05, 15.75 in closer spacing.with nitrogen levels 100kg/ha, 150kg/ha and 200kg/ha respectively (Table 1). At 30, DAP in late planted August crop the minimum thrips population 15.48, 15.4, 19.3 in close spacing and nitrogen levels 100kg/ha, 150kg/ha and 200kg/ha respectively. Where as it was increased with increase in spacing and nitrogen levels. Evidently the occurrence of thrips population was closely associated with plant density or plant to plants spacing. The lowest thrips population was observed with closer spacing 60x30cm Even at 40 DAP the highest thrips population (18.48) was recorded with wider spacing 60x60cm and high nitrogen dose @200kg/ha in late planted (August) crop. At 50 DAP also, the same result was recorded the lowest thrips population 14.73, was recorded in the closer spacing in early planted (June 1st) crop.

Rabi

Thrips population

At 30 DAP, lowest population of 5.58 thrips was observed at closer spacing 60x30 cm and lower

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nitrogen 100 Kg/ha in early planted September 1st crop. Thrips population significantly increased to 12.55 with wider spacing 60x60 cm and high nitrogen content 200 Kg/ha (Table 2).

Over all data revealed that the factors dates of sowing, spacing levels and nitrogen levels had significant influence on the occurrence of thrips population. The closer the spacing resulted the lower was the thrips incidence. The thrips population was increased from 30 DAP to 50 DAP and then declined from 60 DAP. The thrips population was lowest in early planted crop and highest in late planted crop and medium in normal planted crop in *kharif* and *Rabi* seasons. The thrips population was highest in *kharif* followed by *Rabi* season. The observation clearly indicated the thrips populations were having a significant relationship with the stage of the crop. population was low at 30 DAP and increased progressively up to 50 DAP to reach peack levels.

When the interaction effect studied the thrips population had significant difference between date of planting, spacing levels and nitrogen levels.

Yield Data

In the *kharif* , maximum yield was recorded in the treatment combination D2S2N2 (29.14 t/ha) i.e. normal data of planting (July 1st) + normal spacing (60X45cm) + normal nitrogen level (150kg/ha) followed by D2S2N1 (28.52 t/ha) i.e. Normal data of planting (July 1st) + normal spacing (60X45cm) + low level nitrogen (100kg/ha) in *rabi* 2007, maximum yield was recorded in the same combination D2S2N2 (30.54 t/ha). (Table.3)

Phase –II: *Kharif*

Thrips population

At 30 DAP, the lowest thrips population in spray treatment with S_1-seed treatment with imidacloprid @ 5 g/Kg seed and spray with imidacloprid 0.4 ml/L. of water with barrier crop further there was increase in thrips population up to 50 DAP and declined significantly at 60 DAP (Table 4).

Rabi

Thrips population

At 30 DAP lowest population of thrips (1.91) was observed at spray treatment with S_1-seed treatment with imidacloprid @ 5 g/Kg seed and spray with imidacloprid 0.4 ml/L of water with barrier crop further there was increase in thrips population up to 50 DAP and declined significantly at 60 DAP (Table 5)

Yield Data

Highest yields were recorded in C1B1S1 treatment combination during *kharif* 2010 (28.11 t/ha) and in *rabi* (29.05 t/ha) respectively (Table 6).

Table 1. Thrips population counts on tomato phase -1 *kharif* 2009-2010

	D1(30 DAP)			D1 (40 DAP)			D1 (50DAP)			D1 (60DAP)		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
N1	13.81(21.81)	14.41(22.30)	14.72(22.55)	13.5(25.70)	12.38(22.38)	13.53(21.97)	14.73(22.71)	14.48(23.14)	14.03(22.79)	14.71(22.55)	13.24(21.30)	14.29(22.22)
N2	15.64(23.26)	15.65(23.26)	15.43(23.11)	14.24(23.42)	14.64(22.95)	15.96(21.81)	15.84(23.14)	15.2(24.12)	14.84(23.11)	15.55(23.19)	13.71(21.71)	15.29(23.03)
N3	17.25(24.55)	16.55(24.00)	17.33(24.60)	16.04(23.81)	18.16(23.58)	17.52(24.00)	16.29(23.81)	16(24.95)	16.56(23.81)	16.36(23.81)	14.75(22.55)	16.01(23.58)
	D2 (30 DAP)			D2 (40 DAP)			D2 (50DAP)			D2 (60DAP)		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
N1	12.48(20.70)	13.45(21.50)	12.21(20.44)	12.88(21.30)	14.64(21.89)	14(21.97)	13.24(21.34)	13.85(21.85)	14.01(21.97)	13.17(21.30)	11.75(20.80)	12.11(20.36)
N2	14.05(21.97)	1.4(16.80)	12.83(20.96)	14.24(21.97)	1.6(17.92)	11.88(22.55)	13.99(21.99)	1.9(7.92)	14.73(22.55)	13.88(21.89)	1.17(6.29)	12.93(21.05)
N3	15.75(23.38)	14.04(21.97)	14.91(22.71)	15.52(22.38)	14.96(22.38)	16.16(22.95)	14.55(22.41)	14.5522.41)	15.22(22.95)	14.13(22.06)	21.31(20.53)	13.67(21.72)
	D3 (30DAP)			D3 (40 DAP)			D3 (50DAP)			D3 (60DAP)		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
N1	15.48(23.34)	13.42(23.19)	14.52(22.30)	14.13(23.190	12.56(23.42)	15.64(24.27)	16.26(23.80)	15.84(23.45)	16.89(24.27)	13.26(21.34)	14.28(22.22)	14.69(22.55)
N2	15.4(24.30)	16.88(23.89)	16.96(23.42)	15.76(24.27)	14.16(24.42)	14.96(24.84)	16.87(24.25)	16.26(23.80)	17.65(24.84)	13.89(21.89)	15.05(22.79)	15.29(23.03)
N3	19.3(25.33)	19.32(24.35)	16.4(24.45)	14.72(25.00)	16.72(25.10)	18.48(25.44)	18.01(25.10)	18.03(25.10)	18.46(25.44)	14.73(22.55)	15.85(23.44)	16.16(23.70)
	30 DAP			40 DAP	CRITICAL DIFFERENCE		50 DAP			60 DAP		
FACTORS	SEm	CRITICAL DIFFERENCE	FACTORS	SEm		FACTORS	SEm	CRITICAL DIFFERENCE	FACTORS	SEm	CRITICAL DIFFERENCE	
F1	0.7685	1.5803*	F1	0.8863	1.8222*	F1	0.9232	1.8980*	F1	0.6486	1.3335*	
F2	0.7685	1.5308*	F2	0.8863	1.8222*	F2	0.9232	1.8980*	F2	0.6486	1.3335*	

F3	0.7685	1.5308*	F3	0.8863	1.8222*	F3	0.9232	1.8980*	F3	0.6486	1.3335*	
F1*f2	1.3291	2.7326	F1*f2	1.5332	3.1522*	F1*f2	1.5990	3.2875*	F1*f2	1.1233	2.3095*	
F1*f3	1.3291	2.7326	F1*f3	1.5332	3.1522*	F1*f3	1.5990	3.2875*	F1*f3	1.1233	2.3095*	
F2*f3	1.3291	2.7326	F2*f3	1.5332	3.1522*	F2*f3	1.5990	3.2875*	F2*f3	1.1233	2.3095 NS	
F1*f2*f3	2.3055	4.7401	F1*f2*f3	2.6589	5.4666*	F1*f2*f3	2.7696	5.9429*	F1*f2*f3	1.9458	4.0005 NS	

Figures in parentheses are square root transformed values.

Table 2. Thrips population counts on tomato phase -1 *rabi* 2009 -2010

	D1 (30DAP)			**D1 (40DAP)**			**D1 (50DAP)**			**D1 (60DAP)**		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
N1	5.58(13.66)	6.12(14.32)	9.06(17.51)	9.55(17.99)	10.24(18.65)	11.84(20.12)	20.14(26.65)	24.05(29.35)	24.46(29.63)	3.12(10.17)	4.21 (11.83)	5.24(13.23)
N2	8.25(16.68)	8.84(17.29)	10.27(18.68)	9.84(18.27)	10.55(18.95)	13.44 (21.5)	22.28(28.15)	24.92(29.93)	26.11(30.72)	5.45(13.49)	7.91(16.33)	8.66(17.11)
N3	10.25(18.66)	11.24(19.58)	12.55(20.74)	11.86(20.14)	12.44(20.64)	16.33(23.82)	24.41(29.59)	26.66(31.07)	28.29(32.12)	6.44(14.69)	8.02(16.44)	9.55(17.99)
	D2 (30 DAP)			D2 (40 DAP)			D2 (50DAP)			D2 (60DAP)		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
N1	2.44(8.98)	3.41(10.64)	6.24(14.46)	4.26(11.91)	6.97(15.3)	8.11(16.54)	16.84(24.22)	18.56(25.51)	19.06(25.87)	2.41(8.93)	3.46(10.72)	5.18(13.15)
N2	5.06(12.99)	5.24(13.23)	7.33(15.7)	6.34(14.58)	6.99(15.32)	10.21(18.63)	17.44(24.67)	19.22(25.99)	20.85(27.16)	3.28(10.43)	4.11(11.69)	6.11(14.3)
N3	6.26(14.48)	7.69(16.09)	8.11(16.54)	7.69(16.09)	9.33(17.78)	2.59 (9.26)	18.22(25.26)	21.45(27.58)	23.66(29.09)	5.21(13.19)	5.68(13.78)	7.84(16.25)
	D3 (30 DAP)			D3 (40DAP)			D3 (50DAP)			D3 (60DAP)		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
N1	7.76(16.17)	8.27(16.71)	10.24(18.65)	10.66(19.05)	11.66(19.96)	13.21(21.3)	22.85(28.54)	26.66(31.07)	28.44(32.21)	6.12(14.32)	7.29(15.66)	9.11(17.56)
N2	8.02(16.67)	9.45(17.9)	11.33(19.66)	12.71(20.88)	13.11(21.22)	15.06(22.82)	23.11(28.72)	28.55(32.28)	29.24(32.72)	7.69(16.09)	8.09(16.99)	10.05(17.56)
N3	8.75(17.2)	12.82(20.97)	15.46(23.14)	15.04(22.81)	18.41(25.4)	16.24(23.75)	27.22(31.43)	30.11(33.26)	32.24(34.58)	8.14(16.57)	9.44(17.89)	11.24(19.58)
	30 DAP			40 DAP			50 DAP			60 DAP		
FACTORS	SEm	CRITICAL DIFFERENCE	FACTORS	**SEm**	CRITICAL DIFFERENCE	FACTORS	**SEm**	CRITICAL DIFFERENCE	FACTORS	**SEm**	CRITICAL DIFFERENCE	
F1	0.7638	1.5696*	F1	0.8682	1.7841*	F1	0.9252	1.9022*	F1	0.6954	1.4297*	
F2	0.7638	1.5696*	F2	0.8682	1.7841*	F2	0.9252	1.9022*	F2	0.6954	1.4297*	
F3	0.7638	1.5696*	F3	0.8682	1.7841*	F3	0.9252	1.9022*	F3	0.6954	1.4297*	
F1*f2	1.3236	2.7199*	F1*f2	1.5019	3.0788*	F1*f2	1.6024	3.2945*	F1*f2	1.1827	2.4316*	
F1*f3	1.3236	2.7199*	F1*f3	1.5019	3.0788*	F1*f3	1.6024	3.2945*	F1*f3	1.1827	2.4316*	
F2*f3	1.3236	2.7199*	F2*f3	1.5019	3.0788*	F2*f3	1.6024	3.2945*	F2*f3	1.1827	2.4316*	
F1*f2*f3	2.3831	4.8996NS	F1*f2*f3	2.7010	5.5532NS	F1*f2*f3	2.7756	5.7066NS	F1*f2*f3	2.8620	2.8842 NS	

Figures in parentheses are square root transformed values.

Table 3. Influence of different types of Thrips population practices on fruit yield in tomato during *Kharif* and *Rabi* 2009-10 phase- I

Treatment Combination	Yield t/ha	
	kharif – 09	*Rabi* – 09
D1S1N1	25.35	26.85
D1S1N2	27.48	28.98
D1S1N3	26.64	28.14
D1S2N1	27.98	28.48
D1S2N2	28.14	28.64
D1S2N3	27.25	28.74
D1S3N1	27.04	28.19
D1S3N2	26.22	27.82
D1S3N3	27.56	28.97
D2S1N1	27.75	29.22
D2S1N2	27.68	29.18
D2S1N3	27.05	28.55

D2S2N1	28.52	29.96
D2S2N2	29.14	30.54
D2S2N3	28.05	29.34
D2S3N1	28.02	29.52
D2S3N2	27.66	28.96
D2S3N3	27.95	29.15
D3S1N1	24.66	26.16
D3S1N2	26.94	27.44
D3S1N3	25.12	26.62
D3S2N1	26.29	27.79
D3S2N2	26.14	27.64
D3S2N3	26.02	27.52
D3S3N1	25.06	26.56
D3S3N2	25.95	27.45
D3S3N3	24.65	26.15
Sem	0.09	0.11
CD5%	0.27	0.33
CD1%	0.35	0.43
CV	1.77	2.23

D=Days after sowing, S=Spacing, N=Nitrogen.

Table 4. Thrips population counts on tomato phase-II *Kharif* 2010.

July 1-10 30DAP - (C1)			July 11-20 40DAP- (C1)			July 21-30 50DAP- (C1)			July31-Aug-10 60DAP- (C1)		
	B1	B2		B1	B2		B1	B2		B1	B2
S1	2.20 (4.35)	2.71 (6.85)	S1	2.84 (7.57)	2.95 (8.18)	S1	3.53 (11.99)	3.51 (11.81)	S1	2.02 (3.58)	1.90 (3.11)
S2	2.38 (5.17)	2.98 (8.38)	S2	3.09 (9.05)	3.19 (9.7)	S2	3.58 (12.79)	3.72 (13.34)	S2	2.17 (4.22)	1.75 (2.56)
S3	2.77 (7.20)	3.16 (9.47)	S3	3.40 (11.07)	3.51 (11.84)	S3	3.65 (12.82)	3.89 (14.64)	S3	1.94 (3.25)	1.90 (3.1)
July 1-10 30DAP - (C2)			July 11-20 40DAP- (C2)			July 21-30 50DAP- (C2)			July31-Aug-10 60DAP- (C2)		
	B1	B2		B1	B2		B1	B2		B1	B2
S1	1.90 (3.12)	2.17 (4.21)	S1	2.57 (6.12)	2.79 (7.29)	S1	3.01 (8.56)	3.12 (9.21)	S1	1.74 (2.54)	1.73 (2.5)
S2	2.44 (5.45)	2.90 (7.91)	S2	2.86 (7.69)	3.08 (8.99)	S2	3.15 (9.44)	3.26 (10.12)	S2	2.04 (3.65)	2.21 (4.4)
S3	2.63 (6.44)	2.92 (8.02)	S3	2.94 (8.14)	3.15 (9.44)	S3	3.46 (11.47)	3.56 (12.14)	S3	2.02 (3.59)	1.70 (2.38)

	30 DAP		40 DAP			50 DAP			60DAP		
FACTORS	Sem	CRITICAL DIFFERENCE	FACTORS	Sem	CRITICAL DIFFERENCE	FACTORS	Sem	CRITICAL DIFFERENCE	FACTORS	Sem	CRITICAL DIFFERENCE
F1	0.6954	1.4297	F1	0.7638	1.5896	F1	0.9252	1.9022	F1	0.75682	1.55602
F2	0.6954	1.4297	F2	0.7638	1.5896	F2	0.9252	1.9022	F2	0.75682	1.55602
F3	0.6954	1.4297	F3	0.7638	1.5896	F3	0.9252	1.9022	F3	0.75682	1.55602
F1*F2	1.1827	2.4316	F1*F2	1.3236	2.7199	F1*F2	1.6024	3.29453	F1*F2	1.331081	2.695025
F1*F3	1.1827	2.4316	F1*F3	1.3236	2.7199	F1*F3	1.6024	3.29453	F1*F3	1.331081	2.695025
F2*F3	1.1827	2.4316	F2*F3	1.3236	2.7199	F2*F3	1.6024	3.29453	F2*F3	1.331081	2.695025
F1*F2*F3	2.86200	5.8842	F1*F2*F3	2.3831	4.89960	F1*F2*F3	2.7756	5.70660	F1*F2*F3	2.27046	4.66806

Figures in parenthesis are $\sqrt{n+0.5}$

C1=cultural practice – 1, c2 = cultural practice – II, B1=barrier crop, B2=with out barrier crop;
S1, S2, S3 = three types of sprayings.

Table 5. Thrips population counts on tomato phase-II *Rabi* 2010-11.

July 1-10 30DAP - (C1)			July 11-20 40DAP- (C1)			July 21-30 50DAP- (C1)			July31-Aug-10 60DAP- (C1)		
	B1	B2		B1	B2		B1	B2		B1	B2
S1	1.91 (3.14)	2.95 (8.22)	S1	3.32 (10.55)	3.75 (13.59)	S1	4.71 (21.65)	5.73 (32.18)	S1	1.77 (2.64)	2.27 (4.64)
S2	2.41 (5.29)	3.11 (9016)	S2	1.55 (3.89)	4.00 (15.53)	S2	5.09 (25.36)	5.54 (30.14)	S2	1.94 (3.25)	2.42 (5.34)

S3	2.62 (6.34)	3.43 (11.24)	S3	3.67 (12.96)	4.32 (18.13)	S3	4.13 (16.58)	5.37 (28.36)	S3	1.93 (3.22)	2.84 (7.56)
July 1-10 30DAP - (C2)			July 11-20 40DAP- (C2)			July 21-30 50DAP- (C2)			July31-Aug-10 60DAP- (C2)		
	B1	B2		B1	B2		B1	B2		B1	B2
S1	1.96 (3.35)	2.77 (7.15)	S1	2.91 (7.94)	3.57 (12.27)	S1	4.14 (16.6)	4.12 (16.44)	S1	1.83 (2.85)	2.62 (6.34)
S2	2.38 (5.17)	3.04 (8.77)	S2	3.47 (11.5 5)	3.74 (13.5)	S2	4.32 (18.14)	4.34 (18.3)	S2	1.93 (3.24)	2.45 (5.48)
S3	2.73 (6.98)	3.29 (9.35)	S3	3.66 (12.9)	4.00 (15.51)	S3	4.38 (18.69)	4.79 (22.46)	S3	2.42 (5.34)	2.39 (5.23)

30 DAP			40 DAP			50 DAP			60DAP		
FACTORS	Sem	CRITICAL DIFFERENCE	FACTORS	Sem	CRITICAL DIFFERENCE	FACTORS	Sem	CRITICAL DIFFERENCE	FACTORS	Sem	CRITICAL DIFFERENCE
F1	0.6486	1.3354*	F1	0.7685	1.5803*	F1	0.8863	1.2823*	F1	0.8563	1.76137*
F2	0.6486	1.3354*	F2	0.7685	1.5803*	F2	0.8863	1.2823*	F2	0.8563	1.76137*
F3	0.6486	1.3354*	F3	0.7685	1.5803*	F3	0.8863	1.2823*	F3	0.8563	1.76137*
F1*F2	1.1233	2.3095	F1*F2	1.3291	2.7326	F1*F2	1.5332	3.1522	F1*F2	1.4837	3.05069
F1*F3	1.1233	2.3095	F1*F3	1.3291	2.7326	F1*F3	1.5332	3.1522	F1*F3	1.4837	3.05069
F2*F3	1.1233	2.3095	F2*F3	1.3291	2.7326	F2*F3	1.5332	3.1522	F2*F3	1.4837	3.05069
F1*F2*F3	1.94580	4.65050	F1*F2*F3	2.3055	4.74010	F1*F2*F3	2.6589	5.46660	F1*F2*F3	2.57010	4.85145

Figures in parenthesis are $\sqrt{n+0.235}$ transformed

C1=cultural practice – 1, c2 = cultural practice – II, B1=barrier crop, B2=with out barrier crop; S1, S2, S3 = three types of sprayings.

Table 6. Influence of different types of Thrips population practices on fruit yield in tomato during *Kharif* and *Rabi* 2010 phase- II

Treatment Combination	Yield t/ha	
	kharif – 10	*Rabi* – 10
C1B1S1	28.11	29.05
C1B1S2	27.54	28.64
C1B1S3	26.74	27.86
C1B2S1	27.85	28.04
C1B2S2	27.14	27.56
C1B2S3	26.06	27.14
C2B1S1	27.45	27.85
C2B1S2	27.06	27.47
C2B1S3	26.85	27.32
C2B2S1	27.21	27.94
C2B2S2	27.01	27.55
C2B2S3	26.55	27.26
Sem	0.07	0.15
CD5%	0.22	0.44
CD1%	0.30	0.59
CV	1.48	2.88

C1 = cultural practice – 1, C2 = cultural practice – 2,
B1 = Barrier crop (Sorghum), B2 = with out Barrier crop;
S1, S2, S3 – three types of spraying

DISCUSSION

Reddy *et al.* (1978) recorded high incidence of bud necrosis in groundnut crop sown in July which gradually declined in last sowings and reached to a negligible level in the late sowing taken up in December. In contrary to this, the field trail conducted in the present study have clearly indicated that planting of tomato in the first week of July given with a normal spacing of 60 X 45cm and with a nitrogen application of 150 kg / ha has proved as the best agronomic practice in keeping the disease incidence low. Amin (1983); Reddy *et al.* (1983a); Reddy *et al.* (1983); Kennedy *et al.* (1990), Gopal (1998); Tsai *et al.* (1995); Dandnaik *et al.*(1996); Patil (1993); Weeks and Hagan (1992); Su and Chen (1986); Kadamben and Ramanujam (1987) have made management studies in groundnut with cultural

practices such as seed rate and spacing, intercroping, maintenance of barrier crops all around, sprays with chemicals and plant products.

Weeks and Hagan (1992) studied date of planting in relation to TSWV and thrips population. Patil (1993) revealed that groundnut crop sown in first fortnight of June showed lower incidence of GBNV (8.3%) than late sown crop (27.2% GBNV). However, the variation in incidence of bud necrosis and the prevalence of vector population totally dependent on local agro-climatic conditions.

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