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Title ASSESSMENT OF YIELD LOSS FROM BUD NECROSIS DISEASE

Authors P W AMIN AND D V R REDDY

Program GROUNDNUT IMPROVEMENT

Journal Articles:

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Estimated page charges _____

Number of reprints desired _____

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Conference Paper:

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Sponsors of Conference (spell out) ICAR, APAU, ESI, ICRISAT

Date or dates: Jan 7-9, 1983 Venue: CPPTI, Hyd.

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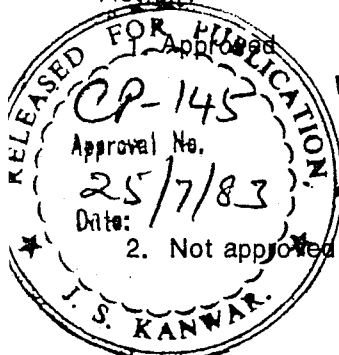
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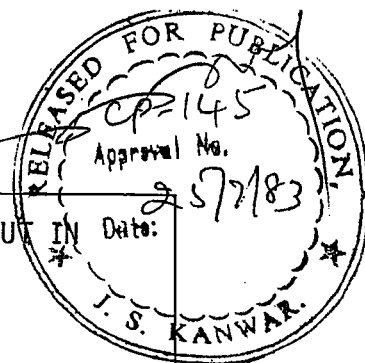
ICRISAT Information Bulletin No. _____

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Released for publication on 25/7/83

July 25, 1983

[Signature]
DIRECTOR OF RESEARCH



ASSESSMENT OF YIELD LOSS FROM BUD NECROSIS DISEASE OF GROUNDNUT IN

ANDHRA PRADESH, INDIA, IN THE RABI 1981-82 SEASON

P.W. AMIN and D.V.R. REDDY*

Summary

Bud necrosis disease (BND), caused by tomato spotted wilt virus, is one of the most important virus diseases of groundnut in India. In order to ascertain the distribution and severity of BND in rabi (postrainy season) groundnut crops in the state of Andhra Pradesh surveys were undertaken in 10 major groundnut growing districts. BND incidence and severity, crop age, and plant density were recorded. The yield loss assessments were based on the area and production, incidence and severity of BND, and on the expected yield from the crop. The crop loss due to BND in Andhra Pradesh has been estimated to be 1500 tonnes of groundnut valued at about Rs.4.5 crores (45 million). We are currently testing another procedure for estimating yield loss which would also take into account compensation of yield in healthy plants adjacent to infected plants. This is expected to be a simple and more realistic method of crop loss estimation for BND.

Introduction

Bud necrosis disease (BND) of groundnut is an economically important disease in the state of Andhra Pradesh, India (Amin and Mohammad, 1980). The disease is caused by tomato spotted wilt virus (Ghanekar *et al.*, 1979) and transmitted by thrips, mainly *Frankliniella schultzei* (Amin *et al.*, 1981).

A survey of rabi (postrainy season) groundnut growing areas in 10 districts of Andhra Pradesh was conducted between the end of March and the first week of April 1982, to record the incidence and severity

*Groundnut Entomologist and Principal Virologist, Groundnut Improvement Program, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru P.O., Andhra Pradesh 502 324, India.

1 of BND. The period for survey was chosen because in the rabi
2 (postrainy) season the thrips population declines after February and
3 therefore very little disease spread occurs after March. The thrips
4 migration does not depend upon the age of crop and therefore even in
5 young crops further disease spread after March is not likely to occur.

6 Methodology

7 In all the areas surveyed, a local variety of Spanish type groundnut
8 referred to as TMV-2 was cultivated. In each district a minimum of six
9 fields of 1 ha or more, located in major groundnut growing areas, were
10 chosen. An area of 10 sq.m. at 3-5 locations per field was chosen in a
11 diagonal fashion and observations on the numbers of healthy and
12 infected plants, and on the approximate age of crop were recorded.
13 Infected plants were grouped into two categories: those showing early
14 infection (symptoms including stunting; axillary shoot proliferation,
15 leaf deformity and death of the plant) or late infection (symptoms
16 including ring spots on young leaves, and necrosis of the terminal bud).
17 For estimating yield loss all early infected plants were regarded as
18 contributing 90% of the yield loss and the late infected plants 50%
19 of the yield loss (Prasad Rao *et al.*, 1980) (Table 1).

20 The information on the area of groundnut production was obtained
21 from the officials of the Department of Agriculture. The yield was
22 determined on the basis of 5 years' average from the data supplied by
23 the Directorate of Oilseeds Research, Indian Council of Agriculture
24 Research, Hyderabad.

25 Results

26 Losses from BND for each district surveyed are given in Table 2. The
27 disease was present in all the surveyed districts and the majority of

1 plants appeared to be infected when they were 60-70 days old, with
2 the exception of some late sown crops in Khammam district where a
3 higher number of plants with early infection were observed. The
4 highest crop loss was estimated from Nalgonda district followed by
5 Kurnool and Mahboobnagar districts. The low incidence of BND in
6 Guntur district was mainly due to good plant stands resulting from a
7 high seeding rate, the use of seed dressings, and good crop management.
8 In the same district the fields with sparse plant populations had
9 over 50% BND incidence. The disease incidence in Nellore and Chittoor
10 districts was very low irrespective of plant stand and sowing date,
11 so that yield losses were negligible. In Nizamabad district, crops
12 sown in the month of December had a higher disease incidence than
13 those sown in the third week of January. The total yield loss from
14 BND in seven districts was estimated to be worth Rs.45 million
15 (US \$4.5 million). Estimates were not made for Anantapur district
16 because only three locations were visited which were not considered
17 representative of the district.

18 Discussion

19 It is evident from our surveys and calculations that BND causes
20 substantial yield losses to the postrainy groundnut crop in
21 Andhra Pradesh. Fields that were managed properly, seeded at the
22 optimum rate, and where appropriate seed treatment was used resulting
23 in good plant stands, were least affected by the disease and
24 had lower yield losses. Such groundnut fields were observed in parts
25 of Guntur district. In Nellore and Chittoor districts, the disease
26 incidence was low, probably because of low vector population or low
27 virus inoculum or both.

One of the major disadvantages of calculating yield loss on the basis of incidence and severity of disease, and the age of the crop, as was done in this survey, is that compensation, if any, derived from healthy plants adjacent to disease plants is not taken into consideration. We are currently preparing a field scale for scoring BND which would take into consideration the severity of symptoms, the age of plants at the time of infection, and the incidence of disease. We are also currently conducting experiments to estimate the amount of yield compensation in healthy plants adjacent to infected plants in relation to sowing dates, spacing and soil fertility. We expect that this information would provide a more realistic estimate of yield loss caused by BND.

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Table 1. Effect of bud necrosis disease on yield of plants infected at different ages under field conditions (Rabi 1980-81)

Crop age in days when symptoms were first noticed	Yield (g)/plant ^{1/}		% Loss	
	Pods	kernels	Pods	Kernels
35	0.0	0.0	100.0	100.0
41	0.0	0.0	100.0	100.0
48	0.1	0.0	99.7	100.0
55	4.2	2.3	89.0	90.8
62	10.6	6.0	72.0	76.0
71	19.2	11.5	49.1	53.5
78	24.0	14.8	36.5	40.4
85	26.5	17.1	30.0	31.0
97	32.8	21.8	13.2	12.7
No symptoms	37.8	24.8		

^{1/} Average for 600 plants in each age group. Experiments were conducted at ICRISAT Center in the 1980-81 rabi (postrainy) season. Row-to-row spacing was 75 cm and plant to plant spacing was 15 cm. The crop was raised in alfisols in high fertility precision fields.

Table 2. Districtwise estimate of yield loss from bud necrosis disease of groundnut in Andhra Pradesh in Rabi 1981-82 season

District	Area (ha)	Production (tonnes)	Average yield (kg/ha)	Age (days) of crop when visited	Plant population (100000/ha)	BND incidence % Early	% Late	Expected yield loss	Amount of crop loss (kg)	Value (million rupees)
Nizamabad	7,000	7500	1050	60-80	2.4	4.4	17.6	13.0	1000	3.0
Khammam	8,000	11200	1460	40-60	3.0	4.0	6.0	7.5	850	2.5
Guntur	30,000	33000	1100	60-80	4.0	0.7	6.3	3.5	1200	3.6
Prakasham	15,000	16500	1100	40-90	3.0	0.7	6.3	3.5	600	1.8
Nellore	20,000	22000	1100	60-90	4.5	0.1	0.9	Negligible	-	-
Chittoor	18,000	32000	1775	20-60	4.0	0.3	2.7	1.5	Negligible	-
Anantapur	20,000	30000	1487	30-70	2.5	2.0	3.0	3.5	Not estimated*	
Kurnool	50,000	67000	1340	60-100	2.2	1.0	9.0	5.4	3600	10.8
Mahboobnagar	35,000	42000	1200	60-90	2.5	1.0	9.0	5.4	2300	6.9
Nalgonda	25,000	3200	1100	60-80	2.0	10.0	15.0	16.5	5280	16.0
Total									14830	44.4

* Data for only 3 locations

Early infected plants were expected to produce 90% less yield and late infected plants 50% less yield. Figures on area production were taken from State Agriculture Department and Directorate of Oilseeds Research, ICAR, Rajendranagar, Hyderabad. Yield/ha is based on an average of five rabi (post-rainy) seasons' yields.