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RESEARCH ARTICLE

Evaluation of promising groundnut genotypes for yield and their reaction to leaf spot diseases in North coastal zone of Andhra Pradesh

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ABSTRACT

Field trials were conducted at Agricultural Research Station, Amadalavalasa for three consecutive *Kharif* seasons of 2009-2010 , 2010-2011 and 2011-2012 to evaluate sixteen promising genotypes (inclusive of Abhaya as check) for yield and their reaction to early and late leaf spots under natural (unprotected) conditions in Randomized Block Design(RBD) with three replications of 20 sq.m. plot. Observations on dry pod yield, shelling per cent and dry haulm yield were recorded after harvesting. Early leaf spot and late leaf spot observations were recorded from natural initiation of disease up to harvest at 20 days interval and genotypes were categorized based on 1-9 scale. Significantly highest average dry pod yield and shelling per cent was recorded in FDR 79(1860.53 kg/ha and 68.50%) and TCGS 894 (1804.53 kg/ha and 67.56%). Out of 16 genotypes evaluated for their reaction to leaf spot diseases, early leaf spot disease was recorded in the range of 6.83 per cent (FDR-79) during *Kharif* 2009-2010 up to 51.9 per cent (DRT 43) during *Kharif*-2010-2011. FDR-79 has resistant reaction to early leaf spot for three consecutive years with severities of 6.83, 9.48 and 8.95 per cent during 2009-2010, 2010-2011 and 2011-2012, respectively, mean severity was also observed to be lowest (8.42%), hence, the entry has resistant reaction to early leaf spot among the genotypes evaluated under natural field conditions. Late leaf spot was observed in the range of 10.00 per cent (FDR-79) during *Kharif*-2011-2012 up to 48.00 per cent (TCGS 983) during 2011-2012 and none of the entries was resistant to late leaf spot. FDR 79 and TCGS 894 were found to be superior and suitable genotypes for North coastal zone of Andhra Pradesh.

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INTRODUCTION

Groundnut is gaining popularity among North coastal zone farming community of Andhra Pradesh in the recent past and is being cultivated extensively in *Kharif* season in an acerage 45000 ha. with yield of 49000 MT and with productivity of 1076 kg/ha (Anonymous, 2010-11). High yielding, pest and disease resistant and adoptable varieties are very much needed in the present scenario. Among the biotic production constraints, diseases are quite important constraints in groundnut crop from sowing to harvesting. Early leaf spot caused by *Cercospora arachidicola* Hori and late leaf spot caused by *Phaeoisasariopsis personata* (Berk. and Curt.) v. Arx are important among diseases and often result in severe defoliation which is ignorantly linked to maturity by farmers resulting in almost 80 per cent of the leaves on groundnut plants are defoliated due to combined attack of Cercospora leaf spot diseases (Ize *et al.,* 2007). Hence an attempt was made to evaluate the selective promising genotypes from Kadiri and Tirupathi ground nut research

stations, Andhra Pradesh for their yield and their reaction against the leaf spot diseases in North coastal zone of Andhra Pradesh.

MATERIALS AND METHODS

Experimental trials were conducted for three consecutive *Kharif* seasons from 2009-2012 at Agricultural Research Station, Amadalavalasa having light red sandy loamy soils, poor in organic matter, soil pH 5.5-6.5, nutritional status of nitrogen 216-297, phosphorus14.8 -25.0 and potassium 183-250 kg/ha. with a total average rainfall of 802.23 mm received for the past 10 years.

Trials were conducted in Randomized Block Design in three replications with plot size of 20 sq.m(Gomez and Gomez, 1984), 20 kg nitrogen in the form of urea, 50 kg phosphorus as single super phosphate and 40 kg potash in the form of murate of potash + 500 kg gypsum (at early flowering stage) were applied per hectare, no fungicidal sprays were taken up in these trials.

Sixteen promising genotypes from Agricultural Research Station, Kadiri and Tirupathi were evaluated for their yield performance and their reaction to early and late leaf spots under natural conditions. Observations on shelling per cent (kernel to shell weight ratio), dry haulm yield(depoded and dried plants weight) and dry pod yield were recorded after harvest. Observations in 20 randomly selected plants per plot on early and late leaf spot were recorded on all entries at 20 days interval from disease initiation to till harvest. Symptomatology based differentiation was done to differentiate early and late leaf spots at maturity to avoid misinterpretation of observations. Scoring was given to main stem only by dividing it into 3 parts as bottom, middle and top based on number of branches. Based on the severity of leaf lesions, defoliation on bottom, middle and upper portion of plants, 1-9 common scale was adopted for both diseases as per Subrahmanyam *et al.*(1995) given below :

RESULTS AND DISCUSSION

Significantly highest average dry pod yield (1860.53 kg/ha.) and shelling per cent (68.59%) was recorded in FDR 79 followed by TCGS 894 (1804.53 kg/ha and 67.56%) (Table 1 and Fig..1 and 2) and were at par, shelling per cent of Abhaya (check) (68.72%) was at par with aforementioned genotypes. K 1468, K 1470 and K 1482 have yielded significantly highest average dry haulm of 3749.0, 3868.9 and 4130.5 kg/ha, respectively and were at par with each other (Table 1) ascertaining their dual purpose value of food and fodder.

Among 16 genotypes evaluated for their reaction to leaf spot diseases, early leaf spot disease was recorded in the range of 6.83 per cent (FDR-79) to 53.0 per cent (K 1470) during *Kharif* 2009, 9.48 per cent (FDR-79) to 42.93 per cent (DRT-43) in *Kharif*-2010 and 8.95 per cent (FDR-79) to 37.87 per cent (K-1452) in *Kharif*-2011. The genotype FDR -79 has resistant reaction to early leaf spot for three consecutive years with severities of 6.83, 9.48 and 8.95 per cent during 2009-2010, 2010-2011 and 2011-2012, respectively with mean severity of 8.42 per cent (Table 2 and Fig.3). Mean reaction of 14 genotypes were moderately resistant and K-1452 was susceptible to early leaf spot. Late leaf spot was observed in the range of 10.00 per cent (FDR-79) to 49.8 per cent (TCGS 983) during 2011-2012, however, FDR-79 has recorded lowest mean severity of 22.3 per cent and it has resistant reaction (10.00%) during *Kharif*-2011-2012. FDR-79 was observed to showed comparatively less susceptible to late leaf spot disease. Among the 16 genotypes screened against late leaf spot diseases, six were moderately resistant, one was moderately susceptible and nine were susceptible. The genotype FDR-79 resistant to early leaf spot and moderately resistant to late leaf spot can be used for developing the leaf spot resistant varieties in groundnut.

Ruben and Mrema (1990) reported that shelling per cent was moderately but significantly ($p<0.05$) correlated ($r=0.57$) with yield and it is in concurrence with the present research

Scale	Description	Severity(%)
1.	No disease	0
2.	Lesions present largely on lower leaves, no defoliation	1-5
3.	Lesions present largely on lower leaves, very few on middle leaves, defoliation of some leaflets, evident on lower leaves	6-10
4.	Lesions present on all lower leaves and middle leaves, over 50% defoliation of lower leaves	11-20
5.	Lesions present on all lower leaves and middle leaves, over 50% defoliation on lower leaves	21-30
6.	Severe lesions present on all lower leaves and middle leaves, lesions present but less severe on top leaves; extensive defoliation of lower leaves, defoliation of some leaflets, evident on middle leaves	31-40
7.	Lesions on all leaves but less severe on top leaves, defoliation of all lower leaves and some middle leaves.	41-60
8.	Defoliation of all lower and middle leaves, severe lesions on top leaves, some defoliation of top leaves evident	61-80
9.	Almost all leaves defoliated, leaving bare stem, some leaflets may remain but showing severe leaf spots	81-100

Based on the aforementioned scale, genotypes were catagorized into resistant- 1-3 scale; Moderately resistant: 4-6 scale; Susceptible: 7-9 scale

Table 1 : Yield attributes of promising genotype

Entry	Dry pod yield (kg/ha)				Shelling (%)				Dry haulm yield (kg/ha.)			
	2009	2010	2011	Mean	2009	2010	2012	Mean	2009	2010	2011	Mean
K-1392	1453.9	444	2450	1449.3	64.67	63.00	63.38	64.38	3644.4	2172	1455	2423.8
TCGS 894	1898.6	1082	2433	1804.53	70.67	65.33	65.56	67.56	3377.7	1791	1170	2112.9
K 1451	1788.7	871	2261	1640.23	68.67	64.33	64.46	66.46	3407.4	2897	1369	2557.8
TCGS 983	1466.7	877	2261	1534.90	67.67	63.67	63.17	65.17	3431.1	2180	1484	2365.0
K-1452	1842.3	726	2124	1564.10	66.67	60.67	60.22	63.22	3602.9	3303	1807	2904.3
TCGS 983-1	1429.0	646	2353	1476.00	67.67	65.33	65.25	66.25	3588.1	2373	1804	2588.3
K-1454	1624	751	2640	1671.66	64.67	67.33	67.48	66.48	4447.4	3265	1760	3157.4
FDR-79	2106.6	1034	2441	1860.53	70.67	61.0	61.99	68.59	5925.9	2110	1161	3065.6
K 1463	1469.9	643	2083	1398.63	69.67	66.67	66.59	65.99	4764.4	2142	1132	2679.4
ABHAYA(c)	1677.3	707	2086	1490.10	71.67	66	66.72	68.72	5333.3	3464	1481	3426.1
K 1468	1504.5	913	1274	1230.5	65.67	60.33	60.86	62.86	5822.2	4151	1274	3749.0
KADIRI 6	1367.1	723	2707	1599.03	73.67	60.33	60.83	65.83	4020.7	2207	1274	2500.5
K 1470	1250.6	418	2332	1333.53	66.67	61.67	61.77	63.77	5608.8	3879	2119	3868.9
KADIRI 9	1778.0	886	2246	1636.66	71.67	61.00	61.49	65.49	4136.2	3197	1911	3081.4
K 1482	1637.3	951	2127	1571.76	67.67	64.00	64.81	65.81	6349.63	4323	1719	4130.5
DRT 43	2140.1	1164	1013	1439.03	65.67	65.00	65.47	65.45	4026.66	3111	1520	2885.8
S Em±	144.77	176.75	137.13	195.54	1.21	1.41	1.45	1.28	562.9	362.5	102.49	503.61
C.D.	398.1	510.42	397.13	564.68	3.51	4.07	4.18	3.71	1548.0	1046.8	295.96	1384.9
	(0.01)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.01)	(0.05)	(0.05)	(0.01)

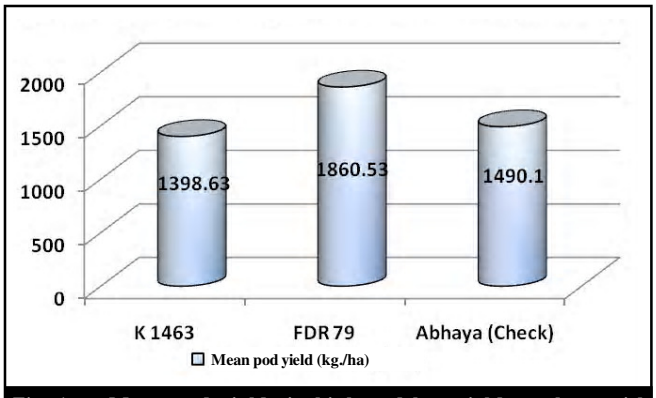

Fig. 1 : Mean pod yields in high and low yielders along with check

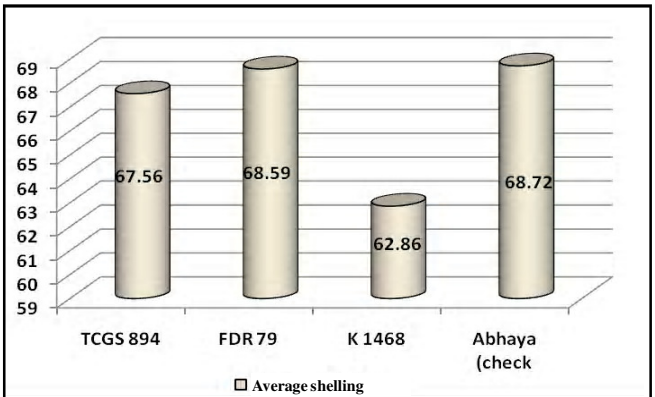

Fig. 2 : Average shelling per cent in respective genotypes

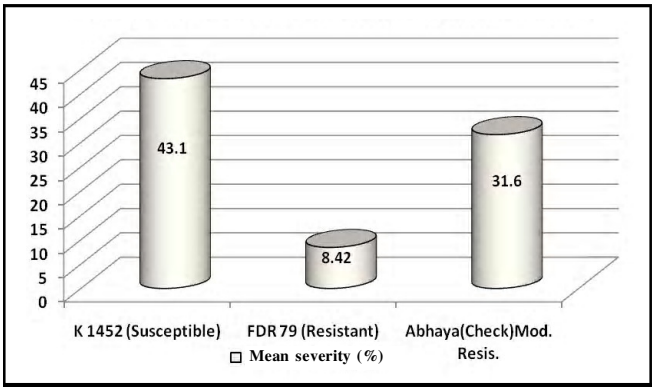

Fig. 3 : Trend of mean severity in susceptible, resistant and chck

findings. On-farm verification of three new groundnut varieties in Zambia, Kanenga(1990) has elucidated that during first season MGS 2 gave higher yield than control in all locations, MGS 3 was found superior in the yield to MGS 2 in second season. Hossain *et al.* (2007) reported that M-9, NCAC-17090, 259/88, 262/88 and 269/89 showed moderately resistant reaction against leaf spot in two different locations and existence of differential reaction under infector-row screening, genotypes 255/8 and 264/89 were moderately resistant in one location and moderately susceptible in another location and similar observations were made by Paningbaton(1980). Izge *et al.* (2007) reported significant levels of susceptibility of varieties to Cercospora leaf spot, the varieties ICGV-IS-96802, ICGV-IS-96827and ICGV-IS-96808 recorded lowest susceptibility to Cercospora disease incidence, highest haulm yield was produced by ICGV-SM-93531, ICGV-I S-96827, ICGV-IS-96802 and ICGV-IS-96801, highest kernel yield and lowest leaf spot diseases were recorded in ICGV-IS-96808. Highest dry pod yield and resistant reaction to early leaf spot in FDR 79 in the present research findings is in conformity with Izge *et al.*(2007) . Rao and Mkhabela (1990) reported that ICGV-SMs 85001, 85053, 86014 and 86053 were satisfactorily high yielding and has disease tolerance to leaf spots and rusts.

TCGS 894 and FDR 79 have yielded significantly high dry pod weight compared to the rest over three *Kharif* seasons, TCGS 894 despite having moderate resistant reaction to early and late leaf spots has yielded at par with FDR 79, genotype FDR 79 was the lone resistant genotype to early leaf spot and high yielding. Both the entries can have greater prospects for North coastal zone of Andhra Pradesh state.

REFERENCES

Anonymous (2010-2011). Directorate of Economics and Statistics, Hyderabad (A.P.) INDIA pp.19

Gomez, K.A. and Gomez, A.A. (1984). *Statistical procedure for agricultural research*. (2nd Ed.) Wiley Interscience Publications., pp.20-30.

Hossain, M. D., Rahman, M. Z., Khatum, A. and Rehman, M.M. (2007). Screening of groundnut genotypes to leaf spot and rust resistance. *Internat. J. Sustainable Crop Prod.*, **2**(1): 7-10.

Izge, A.U., Mohammad, Z. H. and Goni, A. (2007). Levels of variability in groundnut(*Arachis hypogaea* L.) to Cercospora leaf spot disease-Implication for selection. *African J.Agric. Res.*, **2** (4) : 192-196.

Kanenga, K.(1990). On-farm verification of three new groundnut varieties in Zambia. Proceedings of the fourth Regional grounut workshop for southern Africa, Tanzania. Patancheru, Andhra Pradesh-502324, India: International Crop Research Institute for Semi-arid Tropics., pp.37-39.

Paningbatan, A. (1980). Culture, morphology and pathogenic variation of *Cercospora* species causing leaf spots of peanut (*Arachis hypogaea* L.). M.Sc. Thesis, UPLB, College, LAGUNA .

Rao, Y.P. and Mkhabela, S.M. (1990). Groundnut research in Swaziland: 1988/89 cropping season. Proceedings of the fourth Regional grounut workshop for southern Africa, Tanzania. Patancheru, Andhra Pradesh-502324, India: International Crop Research Institute for Semi-arid Tropics., pp. 27-30.

Ruben, S.O.W.M and Mrema, T. S. K. (1990). A path co-efficient analysis, Tanzania. Proceedings of the fourth Regional grounut workshop for Southern Africa, Tanzania. Patancheru, Andhra Pradesh-502324, India: International Crop Research Institute for Semi-arid Tropics., pp.33-36.

Subramanyam, P., Mc Donald, D., Waliyar, F., Reddy, L. J., Nigam, S. N., Gibbons, R. W., Ramanatha Rao, V., Singh, A. K., Pande, S., Reddy, P. P. M. and Subba Rao, P. V. (1995). Screening methods and sources of resistance to rust and late leaf spot in groundnut. Information Bulletin no. **47**, International Crop Research Institute for Semi-Arid and Tropics, Patancheru, (A.P.) INDIA.

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