Elite Groundnut Germplasm

A Ready Reference

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Citation: Rajgopal K. and B.A. Bandyopadhyay, 1999.
Elite Groundnut Germplasm-A Ready Reference.
Technical Bulletin. NRCG, Junagadh. p 35

COMPILED & EDITED BY: K. Rajgopal and A. Bandyopadhyay

PUBLISHED BY:
Director
National Research Centre for Groundnut
P.B. 5, Ivnagar Road
Junagadh - 362 001, Gujarat

COVER PHOTO: Variability in groundnut kernel

PRINTED AT:
Alpha Lithographics,
New Delhi-110 027
Tel: 5490391

FOREWORD

The present erosion of crop genetic resources at an alarming pace calls for immediate steps to conserve the biodiversity. Besides conservation, we have to stake our claim of national sovereignty along with meeting the emerging requirements in the post-CBD era for prior informed consent, equitable sharing of benefits, etc. Bio-diversity legislation is also on the anvil and we must have preparedness for it. The Indian Council of Agricultural Research has established several bureaux to address the agro-biodiversity issues. National Bureau of Plant Genetic Resources (NBPGR), New Delhi is one of them which deals with plant genetic resources.

The National Research Centre for Groundnut (NRCG) is one of the Active Collection Sites under the Indian Plant Genetic Resoures System, and works in close collaboration with NBPGR for consevation, evaluation and utilization of groundnut genetic stocks. At the NRCG, the working collection of cultivated groundnut is maintained and critically evaluated for various desirable traits to identify promising sources as donors in hybridization programmes. The Centre has disseminated the information on germplasm through several catalogues published in the past.

In bringing out this publication, the authors have put efforts to consolidate the scattered information about those accessions identified by the Centre or elsewhere, which are desirable for the traits most frequently sought for by the workers engaged in genetic enhancement of groundnut. The booklet is also available in electronic form as GNUTGERM developed at the NRCG for computer-aided retrieval of the information. The efforts made by the authors in bringing out such a useful information at one place in print as well as in eletronic forms to help the crop improvement workers in selecting speific accessions will be fruitful and rewarding.

(MANGALA RAI)

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PREAMBLE

The National Research Centre for Groundnut (NRCG) was established in the year 1979 at Junagadh (21.31°N, 70.36°E) in the state of Gujarat. The acquisition, maintenance, evaluation, utilization, documentation and distribution of genetic resources of cultivated groundnut (*Arachis hypogaea* L.) and related *Arachis* species is one of the important mandates of the Centre. The work is carried out in collaboration with other institutes of the Indian Council of Agricultural Research (ICAR) especially, with the National Bureau of Plant Genetic Resources (NBPGR), New Delhi. The NRCG collaborates with the State Agricultural Universities (SAU), and the International Crops Research Institute for Semi-arid Tropics (ICRISAT) also, by exchanging germplasm and related information. This Centre has been recognized as one of the Active Collection Sites under the Indian Plant Genetic Resources System (IPGRS) activities of which are monitored by the NBPGR.

Since January 1981, the NRCG had assembled about 10,300 germplasm accessions originating from more than 70 countries for evaluation and subsequent utilization in the groundnut crop improvement programmes in the National Agricultural Research System. The genetic resources of cultivated groundnut have a wide spectrum of variability of both qualitative and quantitative nature, which are being used through hybridization programmes of the NRCG and the All India Coordinated Research Project on Groundnut (AICRPG) and will have continuously to be used in the future also. The working collection is continuously evaluated for various desirable traits at the NRCG and other Centres, with active participation of the Scientists from various disciplines.

Over the years, the utilization of the cultivated and wild groundnut germplasm in crop improvement programmes at the NRCG has led to the development of a number of breeding lines with desired characteristics especially resistance to various biotic and abiotic stresses.

To meet the continuously expanding need for varietal improvement and rewarding breeding efforts, the evaluation of the available genetic resources and dissemination of the information generated, is a pre-requisite. Inventories/ catalogues have been brought out from time to time by the NRCG to disseminate the information on the results of evaluation of genetic resources to the users. The accessions identified have been effectively used in the crop improvement programmes. However, so far a well organized source of information from which a breeder can easily select accessions with certain oft-required attributes required

by him in his programmes, has not been published by the NRCG. To bridge this gap, this compendium has been prepared.

How to use the compendium

In the compendium, the germplasm accessions have been listed under 36 traits (numbered 1 through 36), like agronomic traits, followed by biochemical traits, resistance to abiotic stresses and resistance to biotic stresses and so on. If an accession is desirable for more than one trait listed here, appropriate cross references have also been made. The information has been classified under six columns. The descriptions of the column headings are given below.

Sl. No.	**Serial number**
NRCG	The accession number assigned by the NRCG at the time of incorporation of the material in the active collection.
ICG	ICG (International Groundnut Collection) number assigned by the ICRISAT for the accessions maintained in their world collection.
VARIETY	Name of the accession (including cultivars, land races and breeding lines)
SYNONYM	Number/name assigned by other institutions or agencies is given whereever available.
ORG	Country of origin. Three letter country codes as given by the International Plant Genetic Resources Institute (IPGRI), Rome have been used. The country-abbreviations and number of accessions identified from each country are given in Annexure I.

The passport information given in the above four columns will help the user in identifying the possible source from which the accessions can be obtained by the user.

HBT	Botanical variety to which the accessions belong. The codes used have been **HYB**: Virginia bunch, **HYR**: Virginia runner (subsp. *hypogaea* Krap.*et*. Rig.) (var. *hypogaea* Krap.et Rig.), **VUL**: Spanish (subsp. *fastigiata* Waldron) (var. *vulgaris* Harz.) and **FST**: Valencia (subsp. *fastigiata* Waldron) (var. *fastigiata* Krap.*et*.Greg.)
OTHER TRAITS	An asterisk against the name of the accessions indicates that the trait in the accession has been confirmed by two to three years of testing at Junagadh. The numbers given under this column denotes the serial number of the traits for which also, the accession is desirable.

The accessions printed in bold face are the ones which have already been used in hybridization programmes according to the information available with the NRCG.

The authors hope that the information provided in the compendium will be helpful to the groundnut workers. Henceforth, the compendium will be updated from time to time.

The information available in the compendium is also provided in the floppy diskette for retrieval of the information using the computers. The information is given in a self explained programme named **GNUTGERM** and could be retrived using any computer operated under the DOS environment with a hard drive. To install the programme, the floppy may be inserted and type **install**. The programme will be installed in your selected drive by creating the default sub directory **NRCG** . For running the programme type **GNUTGERM**. In a menu driven mode the main menu displays retrieval of information depending on the choice of desired trait either singly or in combinations.

The authors acknowledge with thanks the help rendered by Mr. N. R. Ghetia, Technical Assistant, in preparing the compendium.

A. DESIRABLE AGRONOMIC TRAITS

Trait: Bold seeds with good pod yield

Trait number: 1

The germplasm accessions having bold-seeds were evaluated with the appropriate checks. The accessions which performed better than the checks and had 100-seed mass of above 55 g have been listed.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	—	—	BG 2		IND	HYB	35,36
2.	1800	2530	C 75		IND	HYR	13
3.	7274	—	JL 54		IND	HYR	28
4.	612	—	Manfredi-112		ARG	VUL	
5.	829	474	NCAC 17147		BRA	FST	
6.	734	5746	NCAC 324		USA	HYB	
7.	1005	5812	NCAC 452		USA	HYB	8,11,28
8.	750	5937	NCAC 6755		USA	HYR	11
9.	5850	811	Va. 61-R		USA	HYR	

Trait: Shelling percent

Trait number: 2

The accessions which recorded mean shelling percentage in the range of 70-75 % with low variation across the three years of evaluation have been listed.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	7362	—	B 138		UNK	HYB	
2.	7451	—	EC 21288		UNK	HYB	
3.	593	4309	Florispan Runner	EC 21888	USA	HYB	8,28
4.	7499	—	G.K. 19		USA	HYB	
5.	1913	4359	R-7-1-1	EC 20914	SDN	HYB	
6.	7410	5183	S 7-2-18	EC 20998	SDN	HYB	

Trait: Percentage of sound mature seeds

Trait number: 3

Good recovery of marketable seeds as sound mature seeds in the range of 93-96% over three years of evaluation have been listed.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	1185	5024	NCAC 1248		JPN	HYB	
2.	710	5026	NCAC 1312		TZA	HYB	
3.	282	6453	NCAC 17749		USA	HYB	4
4.	1473	6364	S.Am.Coll. 66		SAM	VUL	

Trait: 100-seed mass (g)

Trait number: 4

The germplasm accessions with 100 seed mass of above 55 g are as follows.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	254	1602	Ah 7729		UNK	HYB	
2.	306	6502	B 724		UNK	HYB	
3.	—	—	Bombay-48-36-100		UNK	—	
4.	—	4473	Matavere		TZA	HYB	
5.	282	6453	NCAC 17749		USA	HYR	3
6.	6453	9782	RPM 044		MOZ	HYB	
7.	2713	2678	S 7-1-5	EC 20981	BRA.	HYB	
8.	547	4487	S 7-1-6	EC 20962	TZA	HYB	
9.	—	—	S.Am.Col.303-140		UNK	—	
10.	18	104	Small Japan		JPN	FST	36
11.	1932	2702	U 4-7-13		SDN	HYR	
12.	—	—	VRR 298-188		UNK	—	
13.	—	7583	VRR 395		UNK	VUL	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
14.	6836	1763	West Nile	EC 1732	UNK	VUL	
15.	5424	8760	ZM 025		ZMB	HYR	
16.	5426	8762	ZM 055		ZMB	HYR	
17.	5427	8764	ZM 104		ZMB	HYR	
18.	5444	8787	ZM 461		ZMB	HYB	
19.	5447	8793	ZM 560		ZMB	HYR	
20.	5451	8797	ZM 637		ZMB	HYB	
21.	5458	8805	ZM 773		ZMB	HYR	

Trait: Seed longevity

Trait number: 5

The rabi summer produce of germplasm accessions were screened for seed longevity. The pods were dried in the sun after harvest and stored in cloth bags in ambient condition. The seeds were tested for germinability at monthly intervals. The accessions with 60-70 % germination after 7 months of storage are listed below.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	8433	3551	20-3-3		IND	VUL	*
2.	8440	3563	27-5-1		IND	VUL	15
3.	—	4849	Ah 7102		UGA	VUL	
4.	6780	1258	Ah 7154		AUS	HYB	15
5.	—	4839	Ah 7555		IND	VUL	
6.	7243	—	JL 49		IND	VUL	
7.	7249	—	JL 63		IND	VUL	
8.	4495	7979	NCAC 16454	PI 268782	MAR	VUL	
9.	1613	6834	PI 268899		SEN	VUL	14
10.	—	4630	RS 181		IND	VUL	
11.	9438	3455	RS 60		IND	VUL	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
12.	8400	3475	Spanish 5		USA	VUL	
13.	—	3749	T 32		IND	VUL	
14.	—	4658	TG 10		IND	VUL	
15.	2310	3287	U 2-4-7	EC 21144	SDN	VUL	
16.	—	3788	U 4-4-23	EC 21073	UGA	VUL	
17.	—	4709	U 4-47-12	EC 21118	AUS	VUL	
18.	8415	3507	US 4		USA	VUL	
19.	2473	—	Uganda Errect		UGA	FST	
20.	8763	5413	VAR B		UNK	VUL	
21.	7070	—	Wo-Rby-Ichy-Rickwi		TWN	VUL	13

Trait: Peg strength

Trait number: *6*

The germplasm accessions were screened for peg strength by using a textile tensile tester, at the time of maturity. The accessions with pegs breaking at 14.0 - 20.0 N were identified as high peg strength accessions.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	8465	3605	B 1		UGA	FST	
2.	9773	9935	CGC 4018		IND	VUL	13,33
3.	**664**	**1697**	**NCAC 17090**		**PER**	**FST**	***,13,19,24**
4.	**1202**	**5107**	**NCAC 17494**		**USA**	**FST**	**7,27**
5.	—	—	NRGS 1		IND	VUL	
6.	—	—	PI 314819		UNK	FST	
7.	7306	8750	PI 393518		PER	FST	
8.	7307	8753	**PI 393523**		**UNK**	**FST**	
9.	6676	4601	Var. 27		CUB	FST	

B. DESIRABLE BIOCHEMICAL CONSTITUENTS

It may be noted that the contents of oil, protein, sugar etc. are highly variable.

Trait: Oil content (high)

Trait number: 7

The oil content in the seeds was estimated by Soxhlet extraction method and accessions with 52-55 % oil are given below.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	4171	—	Dh 3-20		UNK	VUL	
2.	8922	5723	NCAC 17278		USA	HYB	
3.	1202	5107	NCAC 17494		USA	FST	6,27
4.	1044	6284	NCAC 17500		BOL	FST	*
5.	335	6536	S.Am.Coll.79		MWI	HYR	

Trait: Protein content

Trait number: 8

The total nitrogen was estimated by Micro-Kjeldahl method and the total protein (crude) was computed on the basis of available nitrogen (by using the conversion, protein content = nitrogen % X 5.26). The accessions having >26.0 % protein are given below.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	8941	—	BAU 6		IND	HYB	11
2.	2746	4309	Florispan Runner	EC 21888	USA	HYB	2,28
3.	2794	—	Large Pod Mutant		IND	FST	
4.	734	5746	NC 4		USA	HYB	
5.	1118	421	NCAC 2739		PRY	VUL	
6	1171	1678	NCAC 2828		ARG	FST	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
7.	749	5935	NCAC 3606		USA	HYR	
8.	1005	5812	NCAC 452		USA	HYB	1,11,28
9.	5343	13008	US 54	EC 24437	ZMB	HYR	

Trait: Sugar content (high)

Trait number: 9

Total sugar was estimated by the Anthrone reagent method. The following accessions recorded more than 14 % sugar in the seeds.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	3026	1052	Basse		GMB	HYR	10
2.	8954	5978	GK 3		USA	HYR	10
3.	723	—	NCAC 17878		UNK	—	10
4.	8656	5035	NCAC 2125		USA	HYB	10
5.	698	2357	NCAC 2831		USA	HYR	
6.	994	5755	NCAC 638		USA	HYB	10
7.	7676	—	UUG 7		UNK	—	10

Trait: Oil content (low)

Trait number: 10

Oil content in the seeds was estimated by Soxhlet extraction method and accessions with less than 42.0 % oil is given as low oil accessions.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	9001	2366	Badami Zamini		IRN	HYR	
2.	3026	1052	Basse		GMB	HYR	9
3.	3111	2583	C 158		IND	HYR	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
4.	8954	5978	GK 3		USA	HYR	9
5.	5363	5246	IS-10-NC-4X	EC 39546	MEX	HYB	
6.	8963	10149	MBKB 14		SDN	HYB	
7.	733	5724	NCAC 17279		USA	VUL	
8.	723	—	NCAC 17878		UNK	—	9
9.	8656	5035	NCAC 2125		USA	HYB	9
10.	994	5755	NCAC 638		USA	HYB	*, 9
11.	5505	1	RS 1		IND	HYB	*,11,28
12.	7676	—	UUG 7		UNK	—	*,9
13.	479	7152	VRR 298		IND	HYR	
14.	8970	11011	ZFA 3605		ZMB	HYB	28

Trait: Pod yield & confectionery qualities

Trait number: 11

The germplasm accessions having 100-seed mass of above 55g, better performance over the checks for yield and related traits, low oil content (<42.0 %), high sugar content (>11.0%) and high protein content (> 20.0%) are listed below.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	8939	—	BAU 12		IND	HYB	*,28
2.	8941	—	BAU 6		IND	HYB	8
3.	7276	—	JL 55		IND	HYR	*
4.	1005	5812	NCAC 452		USA	HYB	1,8,28
5.	750	5937	NCAC 6755		USA	HYR	1
6.	5505	1	RS 1		IND	HYB	*,10,28
7.	2863	—	UF 780-14		UNK	HYR	*, 28

C. TOLERANT OF ABIOTIC STRESSES

Trait: Salinity

Trait number: 12

The germplasm accessions were screened for salt tolerance by simulating the salt effect in aluminium trays of 20 kg capacity. Aqueous Sodium chloride solution was applied to the soil to build up the salinity level upto an EC of 12mmho/cm. Based on the germination and survival rate the promising accessions were identified.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	7453	5698	Argentine	EC 21791	USA	VUL	*
2.	7356	—	B 82		UNK	FST	
3.	3554	—	Butani-9		IND	VUL	
4	—	8980	CBRR 4		USA	FST	
5.	3665	3324	Colorado Manfredi	EC 38604	ARG	FST	
6.	1934	—	EC 24886		UNK	HYR	
7.	7537	—	ICGS 48		IND	VUL	
8.	7202	—	J 2		UNK	—	
9.	7548	1531	JH 113		IND	VUL	
10.	4847	7876	JL 19		IND	VUL	
11.	602	3031	Krentile		UNK	—	
12.	4550	7349	M 185-73 K		NGA	HYB	
13.	609	3404	Manfredi-84		ARG	VUL	13
14.	4874	7928	NCAC 10102	PI 268540	BRA	VUL	
15.	160	1330	NG 51-1		IND	FST	1
16.	1657	7906	PI 268802		ZWE	VUL	*
17.	168	1342	R 7-47-10		SDN	VUL	*,13
18.	5507	7	RS 11		UNK	VUL	
19.	2419	—	Riyana		UNK	FST	*
20.	2265	4511	S 7-2-19	EC 20999	TZA	VUL	
21.	5235	—	S-7-4-6	EAH 1087	SDN	HYR	*

Trait: Drought

Trait number: 13

The accessions were screened by subjecting them to normal and soil moisture deficit conditions by controlling irrigations. The irrigation for normal treatment was given at weekly intervals whereas for the stress treatment it was given at an interval of 20 days. Based on the performance of yield and related traits, the soil drought resistance index was computed and the following accessions were identified as drought tolerant.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	7118	—	161308 (P)		UNK	VUL	
2.	7085	1955	655		UNK	VUL	15
3.	1800	2530	C 75		IND	HYR	1
4.	**9774**	**—**	**CGC 3**		**UNK**	**VUL**	
5.	9773	9935	CGC 4018		IND	VUL	6,33
6.	3562	—	Culture No.715		UNK	VUL	
7.	6450	9774	DSA 201		GHA	VUL	15
8.	6934	—	EC 25965		UNK	VUL	
9.	6914	—	Improved spanish	Ah 7682	UNK	VUL	
10.	8346	3369	JH 89		IND	VUL	
11.	7547	3369	JH 89		IND	VUL	
12.	3787	2967	MGS 7		IND	VUL	*
13.	609	3404	Manfredi-84		ARG	VUL	12
14.	3778	3765	Mani Blanco		ARG	VUL	*
15.	—	—	NC 707		UNK	VUL	36
16.	664	1697	NCAC 17090		PER	FST	6,19,24
17.	1116	419	NCAC 2733**		URY	VUL	*
18.	6660	1690	NCAC 2891	PI 149265	TZA	VUL	
19.	8548	7015	NG 336		IND	VUL	
20.	5150	—	No.243		UNK	VUL	*
21.	1604	—	PI 261924		ARG	FST	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
22.	4659	7494	PI 275949		PER	FST	15
23.	6408	8980	PI 339974		USA	FST	27
24.	5386	13340	Perzuvan 46/2	WIR 362	SUN	VUL	
25.	9779	—	PPS 8		UNK	VUL	
26.	7030	—	R 4A		UNK	FST	
27.	168	1342	R 7-47-10		SDN	VUL	12
28.	7627	—	RGR 153		UNK	VUL	*,15
29.	5511	19	RS 50		UNK	HYR	
30.	5311	3298	Starr		USA	VUL	*
31.	7743	7713	TMV 2		IND	VUL	
32.	3920	3501	TMV 9		IND	VUL	*
33.	6123	1139	Tapento		UNK	VUL	
34.	4255	1447	U 4-7-3	NFG 149	NGA	VUL	14,15
35.	2310	—	U-2-4-7	EC 21114	IND	UUL	15
36.	3635	—	U 4-12-3	EAH 1177	ARG	VUL	
37.	9356	2854	US 14		USA	VUL	15,18,24
38.	4481	7162	VRR 308		IND	VUL	*
39.	4677	7514	VRR 321		IND	VUL	
40.	7706	7571	VRR 383		IND	VUL	*
41.	4532	7310	Valencia type		ZWE	—	19
42.	7070	—	Wo-Rby-Ichy-Rickwi		TWN	VUL	5
43.	2510	—	X 9-2B-25-B		IND	VUL	14

** Tolerant of heat also

Trait: Cold

Trait number:14

Seed samples of germplasm accessions were kept for germination in the incubator at temperature cycles of 18°C and 12°C for 8h and 16 h, respectively. The following

accessions have shown more than 75 % germination and good initial seedling vigour in the above temperature range.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	4095	—	56-106-1		UNK	FST	
2.	5025	6931	A.monticola*		ARG	HYB	
3.	9555	8625	Acc # 61	Gadajah	IDN	VUL	
4.	—	3143	Ah 24439		UNK	FST	
5.	9528	3085	Ah 56		IDN	VUL	*
6.	2615	1587	Ah 6429		IND	HYB	34
7.	6738	1192	Ah 812		ARG	VUL	*
8.	—	3098	Ah 814-20		IND	VUL	
9.	—	4446	E 30		UNK	HYB	
10.	6974	1919	EC 162656		UNK	FST	
11.	—	4617	Multicolor		USA	VUL	
12.	4985	8107	NCAC 16477	PI 268805	ZWE	VUL	
13.	955	5145	NCAC 2729		ZAF	HYB	
14.	4472	6917	NCAC 9617	PI 268701	ZAF	VUL	
15.	4119	—	No.417		UNK	VUL	
16.	7782	—	P 86-CTD # 14 84-29		CAN	VUL	
17.	1613	6834	PI 268899		SEN	VUL	5
18.	4776	7717	PI 270864		ZWE	VUL	
19.	1539	7202	PI 270967		ZWE	VUL	
20.	4596	7397	PI 341114		PRY	FST	
21.	2428	—	RS 281		IND	VUL	
22.	5201	—	Selection 2		IND	VUL	
23.	—	76	T 27		IND	HYR	
24.	—	3704	U 1-2-3	EC 21024	ARG	FST	
25.	6901	3283	U 2-1-16		CUB	FST	
26.	—	3738	U 4-4-33	EC 21081	SDN	VUL	

* *A. monticola* is a species easily crossable with with *A. hypogaea*

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
27.	4255	1447	U 4-7-3	EC 21086	NGA	VUL	13,15
28.	4659	7494	WCG 172	Copadina Grande	PER	FST	
29.	2510	—	X 9-2B-25-B		IND	VUL	13
30.	2514	—	You-Ka-Chi		TWN	FST	

Trait: Iron-deficiency chlorosis

Trait number: 15

The germplasm accessions were screened for tolerance of iron-deficiency chlorosis by taking Visual chlorotic rating (VCR) on a 1-5 scale (1 being resistant, 5 being susceptible). The VCR is done at pod filling stage on the deficiency symptoms on the top five leaves.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	7110	—	1710-DR		UNK	HYB	
2.	7075	3563	27-5-1		IND	VUL	*,5
3.	2910	—	2809		UNK	HYB	
4.	7258	9206	58-305		CIV	VUL	*
5.	7267	9422	62-104		SEN	VUL	*
6.	7085	1955	655		UNK	VUL	*,13
7.	7090	1776	673		UNK	VUL	*
8.	6677	4743	88/23/7		GBR	VUL	
9.	99	1151	A 65		TZA	VUL	
10.	6131	1152	Ah 1		MUS	VUL	
11.	1732	3908	Ah 18		LKA	HYR	
12.	5604	514	Ah 2108		IND	HYB	
13.	6133	1154	Ah 22		MOZ	VUL	
14.	6155	1187	Ah 262-2		IND	FST	*
15.	2977	2461	Ah 288		IND	HYR	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
16.	9074	2469	Ah 3430		IND	HYB	
17.	6762	2034	Ah 4226		UNK	VUL	
18.	2980	—	Ah 4471		IND	HYR	
19.	6643	504	Ah 54		ARG	HYB	
20.	9075	2472	Ah 6604		UNK	HYB	
21.	4427	5641	Ah 6914		UNK	HYB	
22.	6076	1081	Ah 7010		IND	HYR	
23.	8588	4873	Ah 7112		IND	HYR	
24.	3006	4872	Ah 7116		IND	HYR	
25.	4404	533	Ah 7151		UNK	HYB	
26.	3498	1258	Ah 7154		AUS	HYB	*,5
27.	6657	1260	Ah 7171	EC 4578	ZAF	FST	*
28.	504	3916	Ah 7188		SLE	HYB	
29.	2649	2996	Ah 7314		CHN	HYB	
30.	2657	2490	Ah 7634		CHN	HYR	
31.	4468	5563	Ah 7863		USA	VUL	*
32.	7347	383	B 18		USA	VUL	*
33.	1808	2538	C 99		IND	HYR	
34.	7169	—	CGC 1		IND	FST	*
35.	7392	—	CGC 105		IND	FST	*
36.	6820	—	Cindoci		IND	VUL	
37.	6450	9774	DSA 201		GHA	VUL	*,13
38.	7417	—	EC 21026		UNK	—	*
39.	4464	3267	EC 21121		BOL	VUL	*
40.	5118	—	Exotic 7-3		UNK	VUL	
41.	9062	2343	FLA 76-10		USA	HYB	
42.	6916	9942	Florigiant	EC 21887	USA	HYR	
43.	7500	—	HG 2		IND	HYB	
44.	7267	9422	ICG 9422		SEN	VUL	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
45.	7139	—	JL 2		IND	VUL	
46.	7246	—	JL 50		IND	VUL	
47.	9544	6586	Kidang Batavia		IDN	HYB	
48.	603	3817	Kopergaon 1		IND	HYB	
49.	4798	7744	M 24-76		NGA	HYB	
50.	4783	7725	M 27-76(1)M		NGA	HYB	
51.	4155	779	Marlab-1	NFG 22	UNK	HYR	33
52.	1189	5077	NCAC 16001		ARG	FST	*
53.	389	6701	NCAC 16061	PI 262003	PRY	VUL	*
54.	4994	8119	NCAC 16927		ZWE	VUL	
55.	7599	464	NCAC 17093	PI 261924	ARG	FST	*
56.	722	5115	NCAC 17529		BRA	HYB	
57.	4770	7689	NCAC 17552		USA	HYB	
58.	4534	7319	NCAC 17643		USA	HYB	
59.	1114	414	NCAC 2718		USA	FST	*
60.	1008	5817	NCAC 3139		USA	HYB	
61.	**5179**	**2271**	**NCAC 343**		**USA**	**HYB**	**18,26**
62.	783	303	NCAC 588		BRA	VUL	*
63.	872	2288	NCAC 841		USA	HYB	33
64.	1003	5766	NCAC 987		ARG	FST	
65.	3262	—	No.259		UNK	HYB	
66.	7027	4747	PI 259747		PER	FST	*,24
67.	4659	7494	PI 275949		PER	FST	*,13
68.	**5186**	**4746**	**PI 298115**		**ISR**	**VUL**	
69.	3294	5380	Punjab Local		IND	HYB	
70.	1189	5077	RCM 449-7		ARG	FST	
71.	7627	—	RGR 153		UNK	VUL	*,13
72.	7607	—	RGR 76		UNK	VUL	*
73.	5513	21	RS 63		UNK	VUL	*

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
74.	2725	4804	S 7-12-6	EAH 1067	MUS	HYB	
75.	2588	—	Sel-4		IND	VUL	*
76.	7206	5981	Spancross		USA	VUL	*,28,35
77.	7664	—	TGS 3		IND	VUL	
78.	7746	—	TMV 2		IND	VUL	
79.	1308	1914	Tainan Sel.9	EC 94943	TWN	FST	*
80.	4255	1447	U 4-7-3	EC 21086	NGA	VUL	*,13,14
81.	2310	—	U-2-4-7	EC 21144	IND	VUL	13
82.	5286	—	U-4-47-13	EAH 1152	TZA	VUL	
83.	6919	1828	US 14	PI 163150	BRA	VUL	*,13,18,24
84.	2498	3527	USA 63		USA	FST	
85.	6310	1384	Valencia Tabra	EC 21037	TZA	FST	*
86.	5389	13342	Zelud	EC 117434	SUN	VUL	*

Trait: Fresh seed dormancy

Trait number: 16

The accessions were tested for germination using the standard method immediately after the harvest and then at 15-days interval, in the kharif and summer seasons. The accessions which failed to germinate were confirmed having fresh seed dormancy. The identified accessions have been listed.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	201	1460	2-2		IND	VUL	*
2.	4080	—	28-8-2		IND	VUL	*
3.	7323	13053	AC 674		UNK	VUL	*
4.	7506	4599	IARI 687		IND	VUL	*
5.	2410	4084	R 4		MWI	VUL	*
6.	2443	—	Spanish 9		USA	VUL	*

D. RESISTANT TO OR TOLERANT OF DISEASES

Scoring for diseases

The collection was scored for their reaction to various economically important diseases like, rust, early leaf spot (ELS) and late leaf spot (LLS) on the well known 1 to 9 scale, either in the disease nursery or in the epiphytotic conditions in the field. The screening of accessions for wilt/root rots was on the following scale.

Scale	Single infection	Multiple infection (> one disease)	Interpretation
1	No mortality	No mortality	resistant,
3	< 2 % plants infected	< 5 % plants infected	moderately resistant
5	3-5 % plants infected	6-15 % plants infected	tolerant
7	6-10 % plants infected	16-25 % plants infected	moderately susceptible
9	> 10 % plants infected	> 25 % plants infected	susceptible

Trait: Resistance to early leaf spot

Trait number: 17

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	2358	3373	JH 134		IND	VUL	
2.	1146	472	NCAC 17143		BRA	FST	21
3.	1123	433	NCAC 2851		BRA	FST	
4.	1086	302	NCAC 586		BRA	FST	
5.	1575	7364	PI 275728		BRA	FST	
6.	2300	3274	U 2-12-2	EAH 1162	ZAR	FST	
7.	5298	3278	U-2-12-8	EAH 1165	SDN	FST	

Trait: Tolerance of early leaf spot

Trait number: 18

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	—	—	Ah 359		UNK	-	
2.	6005	1002	Ah 84		IND	HYR	
3.	7552	—	JH 14		IND	VUL	19,24
4.	9536	4206	Kadang 86	Ah 7293	IDN	HYB	
5.	**6720**	**7013**	**NCAC 17133 (RF)**		**PER**	**VUL**	**21,26**
6.	**1147**	**475**	**NCAC 17149**		**CHN**	**FST**	**21,26**
7.	**6666**	**2271**	**NCAC 343**		**USA**	**HYR**	**15,26**
8.	**5001**	**6022**	**NCAC 927**		**USA**	**HYB**	**21,26,28**
9.	**4738**	**7884**	**PI 341879**		**NGA**	**FST**	**21**
10.	**4861**	**7896**	**PI 393646**		**PER**	**FST**	**21**
11.	3303	2826	RS 7		IND	HYR	
12.	9752	6625	S. Am. Coll. 113		UNK	VUL	19
13.	—	—	TG 26		IND	VUL	19,24
14.	3951	—	U-2-4-5		SEN	VUL	24
15.	2485	12982	US 14		USA	VUL	13,15,24
16.	9757	13028	US 74		IND	HYR	
17.	7863	—	VR 3359		IND	VUL	19,24
18.	457	7091	VRR 235		IND	HYR	
19.	9853	4009	X 1184-1-1-1		IND	HYB	19,24

Trait: Resistance to late leaf spot

Trait number: 19

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	9451	3547	10-1		IND	VUL	24
2.	6385	1477	278-4-2		NGA	VUL	24

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
3.	145	1232	Ah 4226-1		IND	VUL	
4.	6074	1079	Ah 6950		IND	HYR	
5.	—	—	B 613		UNK	—	24
6.	9905	4448	E 33		UNK	HYB	24
7.	6255	1309	EC 21137		TZA	FST	
8.	5106	3303	EC 24118		UNK	HYB	
9.	7552	—	JH 14		IND	VUL	18,24
10.	664	1697	NCAC 17090		PER	FST	6,13,24
11.	**5176**	**1705**	**NCAC 17130**		**PER**	**VUL**	
12.	**5177**	**1707**	**NCAC 17132**		**PER**	**FST**	**24,26**
13.	5178	1710	NCAC 17135		PER	FST	24,26
14.	4738	7626	PI 341839		NGA	FST	24
15.	9752	6625	S.Am Coll. 113		UNK	VUL	18
16.	—	—	TG 26		IND	VUL	18,24
17.	7863	—	VR 3359		IND	VUL	18,24
18.	8472	3618	Valencia Type		ZAF	VUL	13
19.	1564	1706	WCG 184		PER	FST	24
20.	9853	4009	X 1184-1-1-1		IND	HYB	18,24

Trait: Resistance to *Alternaria* leaf spot

Trait number: 20

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	4122	—	11-20977		UNK	—	21
2.	—	—	29-5-II		UNK	—	
3.	7953	2597	C 177		IND	HYR	24
4.	5293	3780	EC 21127		SDN	—	
5.	—	1715	EC 24389		PER	VUL	
6.	—	13077	EC 35994		UNK	—	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
7.	—	1996	Exotic 1-1		IND	VUL	
8.	—	—	JH 35		IND	—	
9.	—	—	NC 3276		UNK	—	
10.	—	—	SP 14-070		UNK	—	
11.	6932	12991	US 25	PI 237337	ISR	VUL	

Trait: Tolerance of *Alternaria* leaf spot

Trait number: 21

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	4122	—	11-20977		UNK	—	20
2.	8434	3554	25-5-11		IND	VUL	
3.	6384	1476	278-4-1		NGA	VUL	
4.	2538	—	28-5-11		UNK	VUL	*
5.	8451	3582	45-25		IND	VUL	
6.	5090	4702	EC 210393		NGA	VUL	
7.	5095	—	EC 21109		UNK	VUL	
8.	5293	3780	EC 21127	U-4-47-18	SWZ	VUL	*
9.	5103	—	EC 21150		USA	VUL	31
10.	9148	1854	EC 24402		ARG	FST	
11.	—	—	EC 24405		UNK	—	
12.	—	—	EC 24419		UNK	—	
13.	9414	3367	JH 33		IND	VUL	
14.	6720	7013	NCAC 17133 (RF)		PER	VUL	18,26
15.	**1146**	**472**	**NCAC 17143**	**SAN 290**	**BRA**	**FST**	**17**
16.	1147	475	NCAC 17149		BRA	FST	18,26
17.	—	—	NCAC 2656		UNK	-	31
18.	1161	1657	NCAC 2658		USA	VUL	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
19.	9237	1669	NCAC 2737		USA	VUL	
20.	9126	1611	NCAC 394		ARG	FST	
21.	1151	1615	NCAC 414		USA	FST	
22.	1153	1620	NCAC 474		IDN	VUL	
23.	4294	387	NCAC 599	CPI 12011	ARG	VUL	
24.	1158	1636	NCAC 889		USA	VUL	
25.	5001	6022	NCAC 927		USA	HYB	18,26,28, 32, 36
26.	—	—	NG 2796		UNK	—	
27.	—	—	NG 3307		UNK	—	
28.	8372	3423	NG 386		IND	VUL	
29.	9255	1848	NG 387		IND	VUL	
30.	—	—	NG 418		UNK	—	
31.	7577	4618	NG 70		IND	VUL	
32.	4113	—	No.3276		UNK	VUL	
33.	7699	7884	PI 341879		UNK	HYB	*,18
34.	4861	7896	PI 393646		PER	FST	*,18
35.	—	—	PI 403723		UNK	—	
36.	—	—	Reg..188-48-35		UNK	—	
37.	9534	3482	Surin		IDN	VUL	
38.	9315	2164	U 4-4-13	EC 21064	NGA	VUL	

Trait: Resistance to leaf blight

Trait number: 22

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	6331	1412	AM 17	EC 21158	BRA	VUL	
2.	3344	3366	JH 25		IND	VUL	
3.	1709	5822	NCAC 17330		USA	VUL	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
4.	4287	271	NCAC 470		BRA	FST	
5.	804	349	NCAC 822		USA	FST	
6.	7009	7837	NG 57		IND	VUL	

Trait: Tolerance of *Alternaria* and blight

Trait number: 23

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	17	94	A 21	EC 1703	TZA	HYR	24
2.	329	6531	AI 368		MWI	HYR	26
3.	1728	2446	Ah 6		IND	HYR	24
4.	—	—	ICGV 86606		UNK	—	
5.	6699	7883	PI 315608		ISR	HYB	
6.	1901	4398	Sambi	EC 4078	KEN	HYB	24

Trait: Resistance to rust

Trait number: 24

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	9451	3547	10-1		IND	VUL	19
2.	6385	1477	278-4-2		NGA	VUL	19
3.	4083	1466	28-204-2		UNK	VUL	
4.	6946	3593	546		UNK	FST	
5.	7968	2627	A 21		TZA	HYR	23
6.	9974	4877	Ah 7010		IND	HYR	
7.	9877	4113	Ah 8020		USA	VUL	
8.	351	6559	AI 375		MWI	HYB	*

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
9.	5011	3001	Asyria Mwitunde		UNK	HYB	
10.	2956	2446	Ah 6		UNK	HYR	*,23
11.	5625	538	Ah 7187		SLE	HYR	
12.	2958	3905	Ah 8	Virginia Bunch	IND	HYR	*
13.	—	—	B 613		UNK	—	19
14.	7953	2597	C 177		IND	HYR	*,20
15.	288	6475	Chitala White		USA	HYR	*
16.	9905	4448	E 33		UNK	HYB	19
17.	1898	4248	EC 1703	EC 1703	TZA	HYR	
18.	8013	2707	EC 35399		UNK	FST	*
19.	—	—	EC 4078		UNK	—	26
20.	9462	3608	Exotic 6		UNK	VUL	
21.	9461	3606	Exotic 7-3		IND	VUL	
22.	5119	3340	Exotic 7-4		IND	HYB	
23.	9471	3668	Improved Small Japan		IND	VUL	
24.	7552	—	JH 14		IND	VUL	18,19
25.	1982	4034	Kanyoma		TZA	HYR	36
26.	664	1697	NCAC 17090		PER	FST	6,13,19
27.	5177	1707	NCAC 17132		PER	FST	19,26
28.	5178	1710	NCAC 17135		PER	FST	19,26
29.	9600	—	PI 152132		BRA	VUL	
30.	6527	4747	PI 259747		PER	FST	15
31.	4738	7626	PI 341839		NGA	FST	*,19
32.	3306	2828	RS 14		IND	HYR	
33.	3312	4398	Sambi	EC 4078	KEN	HYB	23
34.	—	—	TG 26		IND	VUL	18,19
35.	7658	5338	TG 3		IND	VUL	
36.	7133	3493	TG 5		IND	VUL	
37.	3951	—	U-2-4-5		SEN	VUL	18

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
38.	2485	12982	US 14		USA	VUL	13,15,18
39.	4002	—	Uganda		UGA	VUL	
40.	7863	—	VR 3359		IND	VUL	18,19
41.	649	—	Variety 28-206-1		USA	HYR	
42.	1564	1706	WCG 184		PER	FST	*,19
43.	1565	1697	WCG 190		PER	FST	*
44.	9853	4009	X 1184-1-1-1		IND	HYB	18,19

Trait: Tolerance of rust disease

Trait number: 25

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	—	—	14-1		UNK	VUL	
2.	6236	1284	Ah 7341		CHN	VUL	
3.	6987	7852	G 201		IND	HYR	
4.	8547	3764	Local Bunch		IND	FST	
5.	—	—	NC 707		UNK	VUL	
6.	4431	—	PG No.1		UNK	HYB	
7.	6927	3505	US 2	PI 119922	PRY	VUL	27,33

Trait: Tolerance of rust, late leaf spot and *Alternaria*

Trait number: 26

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	329	6531	AI 368		MWI	HYR	*,23
2.	—	—	DRV 1		IND	—	
3.	—	—	DRV 10		IND	—	
4.	—	—	DRV 25		IND	—	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
5.	—	—	DRV 29		IND	—	
6.	1898	4248	EC 1703		TZA	—	
7.	—	—	EC 4078		UNK		24
8.	6672	2716	EC 76446 (292)		UGA	FST	
9.	—	—	ICGV 86020		IND	—	
10.	—	—	ICGV 86594		IND	—	
11.	—	—	ICGV 86667		IND	—	
12.	—	—	ICGV 86707		IND	—	
13.	—	—	ICGV 87160		IND	—	
14.	—	—	ICGV 87254		IND	—	27
15.	—	—	NCAC 1301		UNK	—	
16.	5177	1707	NCAC 17132		PER	FST	19,24
17.	6720	7013	NCAC 17133 (RF)		PER	VUL	*,18,21
18.	5178	1710	NCAC 17135		PER	FST	19,24
19.	1147	475	NCAC 17149		CHN	FST	18,21
20.	6666	2271	NCAC 343		USA	HYB	15,18
21.	5001	6022	NCAC 927		USA	HYB	18,21,28, 32,36
22.	—	7881	PI 215646		PER	FST	
23.	7598	4747	PI 259747		UNK	FST	*
24.	6694	6340	PI 350680		HND	FST	
25.	6701	7887	PI 390595		PER	FST	32
26.	6524	7894	PI 393641		PER	—	*
27.	—	6284	RCM 387	SAN 47	BOL	HYR	

Trait: Resistance to ELS, LLS and rust.

Trait number: 27

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	—	7388	311/63	E 1	ZWE	FST	
2.	—	8680	ACC #922		IDN	FST	
3.	—	4977	AH 163(S)		IND	HYB	
4.	—	4976	AH 32(S)		IND	FST	
5.	—	6156	GA 61-33		USA	FST	
6.	—	—	ICGV 78991		IND	—	
7.	—	—	ICGV 86023		IND	—	
8.	9785	—	ICGV 86564		IND	HYB	
9.	—	—	ICGV 87254		IND	—	26
10.	—	—	ICGV 87280		IND	—	
11.	—	6205	K 322		SUN	FST	
12.	—	7012	Krapovickas 11	KU #14	ARG	FST	
13.	1202	5107	NCAC 17494		USA	FST	6,7
14.	6408	8980	PI 339974		USA	FST	13
15.	—	6774	RCM 549		BRA	FST	
16.	—	8853	RCM 588		BRA	FST	
17.	—	6432	S/A 7		ZAF	FST	
18.	—	6806	S.Am. Coll. 205		UNK	FST	
19.	—	7881	Smith 198	TIFRUST 1	PER	FST	
20.	—	10910	SPZ 453 Red		PER	FST	
21.	—	10022	SPZ 459 Dark pu		PER	FST	
22.	—	10024	SPZ 469 Flesh		PER	FST	
23.	—	10026	SPZ 470 Purple		PER	FST	
24.	—	10027	SPZ 471 Flesh		PER	FST	
25.	—	10937	SPZ 477 Purple		PER	FST	
26.	—	10034	SPZ 480 Flesh		PER	FST	
27.	—	10041	SPZ 484 Purple		PER	FST	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
28.	—	10042	SPZ 485 Dark pu		PER	FST	
29.	—	10043	SPZ 485 Flesh		PER	FST	
30.	—	10045	SPZ 486 Gasp		PER	FST	
31.	—	10048	SPZ 487 Flesh		PER	FST	
32	—	11187	SPZ 497 Tan		PER	FST	
33	—	11088	SPZ 504		PER	FST	
34	—	10450	Tingo Maria		PER	FST	
35.	6927	3505	US 2	PI 119922	PRY	VUL	25,33
36.	—	6264	WCG 111		BRA	FST	

Trait: Resistance to *A. flavus* colonization

Trait number: 28

The screening of germplasm accessions for *in vitro* colonization of seeds by *A.flavus* was conducted under artificially inoculated conditions in the laboratory. The seeds of accessions which supported less than 10 % colonization and less aflatoxin were grouped as resistant.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	9449	3541	1-4		IND	VUL	
2.	—	—	1-7		UNK	-	
3.	6132	1153	Ah 20		WAF	VUL	
4.	6785	3700	Ah 7223		NGA	VUL	
5.	8939	—	BAU 12		IND	HYB	*,11
6.	2668	2497	BH 4-5-2-3		IND	HYR	
7.	8966	10879	BZC 367 Flesh		BOL	HYR	
8.	1840	2569	C 144		IND	HYR	*
9.	3040	—	C-RP-33		UNK	HYR	*
10.	8972	11830	Chanyeong		KOR	HYB	
11.	2746	4309	Florispan Runner	EC 21888	USA	HYB	2,8

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
12.	7211	—	ICGS 26		UNK	HYB	
13.	3222	2768	JH 353		IND	HYR	
14.	7274		JL 54		IND	HYR	1
15	7239	—	JL 60		IND	HYR	*
16.	—	—	JL 62		IND	HYB	
17.	8968	10886	KSSc 402 Overo		BOL	HYB	
18.	8955	5985	NCAC 17387		USA	HYR	
19.	8977	12105	NCAC 18442		USA	HYR	
20.	839	1645	NCAC 1855		USA	HYB	*
21.	1463	6010	NCAC 2309		USA	HYR	
22.	912	2375	NCAC 2938		USA	FST	
23.	1005	5812	NCAC 452		USA	HYB	*,1,8,11
24.	5001	6022	NCAC 927		USA	HYB	18,21,26, 32, 36
25.	634	791	Productore		ZAF	HYR	
26.	8982	—	RG 244		IND	HYB	*
27.	5505	1	RS 1		IND	HYB	* 10,11
28.	5981	972	S 230		IND	HYR	
29.	9465	635	Spancross		USA	VUL	15,35
30.	8974	11848	Suweon 38		KOR	HYB	
31.	8973	11839	Suweon 9		KOR	HYB	
32.	8938	13380	TG 19 A		IND	HYB	35
33.	—	—	UAS 20		UNK	—	
34.	2863	—	UF 780-14		UNK	HYR	11
35.	8970	11011	ZFA 3605		ZMB	HYB	10

Trait: Resistance to *A. niger*

Trait number: 29

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	6054	1053	145-12 P		IND	HYR	
2.	1886	2619	Dixie Runner		USA	HYR	
3.	4942	8057	NCAc 17549		USA	HYR	
4.	870	351	NCAc 832		IND	HYB	
5.	8956	6048	UF 714021		USA	HYB	
6.	2852	633	V 60		SEN	HYR	

Trait: Tolerance of bud necrosis

Trait number: 30

For scoring reaction to virus diseases , 5 m row at five random places were selected to work out the percentage of incidence. The percentage is worked out as under =

$$\frac{\text{No. of infected plants}}{\text{Total no. of plants}} \times 100$$

The accessions found tolerant were as follows.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	14	81	Before		UNK	VUL	
2.	8144	2921	C 145-12-P-7		IND	HYR	36
3.	3173	4375	EC 20927	EC 20927	UGA	—	
4.	—	6561	Kaputo		MWI	HYB	
5.	5537	60	Myria PC		MEX	HYR	
6.	5540	67	S 68		IND	HYR	

Trait: Tolerance of Peanut Stripe Virus

Trait number: 31

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	8446	3571	29-5-2		IND	VUL	
2.	5103	—	EC 21150		USA	VUL	21
3.	—	—	NCAC 2656		UNK	—	21
4.	—	—	PI 341889		UNK	—	

E. RESISTANT TO INSECTS

Trait: Resistance to leaf-miner

Trait number: 32

The damage was assessed following 0-9 scale in 20 leaves collected at random.The accessions having less than 20 % damage was classified as resistant.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	5001	6022	NCAC 927		USA	HYB	18,21,26, 28, 36
2.	6701	7887	PI 390595		PER	FST	26
3.	6704	7890	PI 393526	TIFRUST 10	PER	FST	

Trait: Resistance to jassid

Trait number: 33

The infestation was estimated by counting the percentage of yellowed foliage by visual rating at the time of peak infestation from 10 leaves randomly collected from the 3, 4 or 5 leaf positions on the main axis in a plot of 12.5 sq. m.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	4631	7439	2635-76 S		NGA	HYB	
2.	—	—	4-1		UNK	—	
3.	4140	—	45-28		IND	FST	
4.	135	1217	Ah 3276		IND	VUL	
5.	4826	7840	Ah 8142		IND	VUL	
6.	9773	9934	CGC 4007		IND	VUL	34
7.	9773	9935	CGC 4018		IND	VUL	6,13
8.	—	—	CGC 5-1		IND	VUL	
9.	—	—	CGC 5-2		IND	VUL	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
10.	9767	—	CGC 6		UNK	HYB	
11.	3729	1108	G-Local bunch		UNK	FST	
12.	5807	760	K 4-11-II(R)		UNK	HYR	
13.	4786	7728	M 63-74		NGA	HYB	
14.	4155	779	Marlab-1		MEX	HYR	15
15.	4782	7724	NC 2		USA	HYR	
16.	4993	8118	NCAC 10060		USA	HYR	
17.	4812	7807	NCAC 1092		USA	HYB	
18.	4912	8020	NCAC 17634		USA	HYB	
19.	4745	7658	NCAC 180		USA	FST	
20.	6688	5044	NCAC 2242		USA	HYB	
21.	4178	2249	NCAC 23	NFG 47	USA	HYB	
22.	4176	411	NCAC 2700	NFG 43	BRA	FST	
23.	872	2288	NCAC 841		USA	HYB	15
24.	3818	—	No.420		UNK	VUL	
25.	4822	7831	OG 3-36		IND	VUL	
26.	4615	7418	PI 162534		URY	VUL	
27.	1634	6293	PI 261942		PRY	FST	
28.	4529	7305	PI 262013		ZWE	FST	
29.	4522	7288	PI 262093	139/66	BOL	FST	
30.	1637	7660	PI 268551		UGA	FST	
31.	4620	7425	PI 268814		ZWE	VUL	
32.	**4862**	**7898**	**PI 407454**	**TIFRUST 4**	**ECU**	**FST**	
33.	6417	9511	RPM 007		MOZ	HYR	
34.	6421	9516	RPM 016		MOZ	HYR	
35.	6425	9531	RPM 039		MOZ	HYR	
36.	6427	9534	RPM 048		MOZ	HYR	
37.	4612	7415	SP 1		MWI	HYB	
38.	4161	802	Sel. 11 (PC)		IND	HYR	

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
39.	4561	7362	Sel. from PI 262085		ZWE	FST	
40.	4556	7357	Sel.From PI 261964		ZWE	FST	
41.	6927	3505	US 2	PI 119922	PRY	VUL	25,27
42.	4701	7544	VRR 356		IND	VUL	
43.	4588	7389	Valencia type	E 2	ZWE	FST	

Trait: Resistance to *Spodoptera litura*

Trait number : 34

The damage was assessed on the basis of percentage of foliage devoured, number of larvae and egg masses /m row. The accessions showed < 20 % damage were identified as resistant.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	5724	667	2706		USA	HYB	
2.	2615	1587	Ah 6429		IND	HYB	14
3.	9773	9934	CGC 4007		IND	VUL	33
4.	8313	3302	EC 21989		UNK	HYB	
5.	8673	5123	NCAC 17840		USA	HYB	
6.	5687	620	V 40		SEN	HYR	

Trait: Resistance to ash-weevil

Trait number: 35

The screening procedure was same as above.

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	—	—	BG 2		IND	HYB	1,36
2.	—	—	CGC 5		IND	—	
3.	5014	5286	Makulu Red		ZMB	HYB	
4.	9465	3635	Spancross		USA	VUL	15,28
5.	8938	13380	TG 19 A		IND	HYB	28

F. RESISTANT TO NEMATODES

Trait: Resistance to root-knot nematode

Trait number: 36

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
1.	—	—	13-30		UNK	—	
2.	203	1463	17-5		IND	VUL	
3.	206	1471	55-437	EC 109271	SEN	VUL	
4.	5729	673	2799		USA	VUL	
5.	101	1155	Ah-32 A		IND	VUL	
6.	3509	1268	Ah 7253		SDN	VUL	
7.	371	6591	AI 373		MWI	HYB	
8.	360	6577	AM 1		MWI	HYB	
9.	3149	3701	Apaxue		SUN	VUL	
10.	—	—	BG 1		IND	HYB	
11.	—	—	BG 2		IND	HYB	1,35
12.	5867	831	C 41		IND	HYR	*
13.	42	881	C 145-12-P-7		IND	HYR	30
14.	—	—	EC 85994		UNK	—	
15.	365	6584	Georgia Bunch		USA	HYB	*
16.	3754	3376	JH 223		ARG	FST	
17	3225	—	Jolpin-220-15		UNK	HYR	*
18.	401	6750	Kanyoma		MWI	HYB	24
19.	4414	3863	KG 61-22	NFG 638	IND	HYB	
20.	3237	—	Local Ambadi		IND	HYR	
21.	3242	—	Local Wadmedani (R)		SDN	HYR	
22.	3236	—	Local-256		IND	HYR	*
23.	346	6554	Mabwa Runner		TZA	HYB	*
24.	—	—	NC 707		UNK	VUL	13
25.	5198	6429	NC-6		USA	HYR	*

Sl. No.	NRCG	ICG	VARIETY	SYNONYM	ORG	HBT	OTHER TRAITS
26.	1067	262	NCAc 50		ARG	FST	
27.	1069	264	NCAc 56		NGA	FST	*
28.	1009	5927	NCAc 460		USA	HYB	
29.	1077	284	NCAC 527		USA	VUL	*
30.	1081	—	NCAC 548		UNK	FST	*
31.	785	305	NCAC 592		ARG	VUL	13
32.	1099	336	NCAC 763		URY	VUL	*
33.	870	351	NCAc 832		IND	HYB	
34.	5001	6022	NCAC 927		USA	HYB	18,21, 26, 28, 32
35.	816	—	NCAC 1313		UNK	VUL	
36.	1060	6136	NCAC 2196		USA	HYR	*
37.	1061	6146	NCAc 2298		USA	HYB	
38.	1027	6767	NCAC 2565		UNK	-	
39.	901	—	NCAC 2736		USA	VUL	
40.	1031	6684	NCAc 9937		ZWE	HYR	
41.	1064	—	NCAC 16578		SEN	HYR	
42.	1537	—	PI 270787		ZWE	VUL	
43.	5836	794	Punjab 1-10-1		IND	HYR	
44.	336	6542	S.Am.Coll.106		SAM	HYB	
45.	18	104	Small Japan		JPN	FST	4
46.	4166	808	Talod-34-7		IND	HYR	
47.	184	1389	U 2-1-19	EC 21040	SDN	FST	
48.	481	7161	VRR 207				

Annexure I

Code and Name of countries, and number of accessions identified.

Code	Name	Accessions	Code	Name	Accessions
ARG	Argentina	23	MUS	Mauritius	2
AUS	Australia	3	MWI	Malawi	10
BOL	Bolivia	6	NGA	Nigeria	18
BRA	Brazil	19	PER	Peru	47
CAN	Canada	1	PRY	Paraguay	7
CHN	China	5	SAM	South America	2
CIV	Ivory Coast	1	SDN	Sudan	14
CUB	Cuba	2	SEN	Senegal	10
ECU	Ecuador	1	SLE	Sierra Leone	2
GBR	United Kingdom	1	SUN	Union of Soviet Socialist Republic	4
GHA	Ghana	2	SWZ	Swaziland	1
GMB	Gambia	2	TWN	Taiwan	4
HND	Honduras	1	TZA	Tanzania	15
IDN	Indonesia	7	UGA	Uganda	8
IND	India	167	UNK	Unknown	132
IRN	Iran	1	URY	Uruguay	3
ISR	Israel	3	USA	United States of America	100
JPN	Japan	3	WAF	West Africa	1
KEN	Kenya	2	ZAF	South Africa	6
KOR	Korea	3	ZAR	Zaire	1
LKA	Sri Lanka	1	ZMB	Zambia	11
MAR	Morocco	1	ZWE	Zimbabwe	14
MEX	Mexico	3			
MOZ	Mozambique	6			