REPORT ON AN ASSIGNMENT TO STUDY DISEASES OF GROUNDNUT IN MALAWI

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INTRODUCTION

ICRISAT Regional Groundnut Program for Southern Africa was established at the Chitedze Agricultural Research Station, Lilongwe, Malawi, in July 1982 in response to a request made by the Southern African - Heads of governments at their economic summit meeting held in Lusaka, Zambia in April 1980, to provide assistance in groundnut improvement in the nine Southern African Development Coordination Conference (SADCC) member countries -- Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe. Malawi was chosen as a base for the regional research unit because of the importance of groundnuts in the country and the well established and continuing research efforts on groundnut.

Malawi, Mozambique, Zambia, Tanzania, and Zimbabwe are the most important groundnut growing countries of the region (FAO Production Yearbook, 1980). Groundnuts are not grown in Lesotho. Most of the groundnut crop in the region is grown by small-scale farmers and the average yields are extremely low (about 500 kg/ha) but it has been shown that yields of over 4000 kg/ha can be obtained on research stations and by large - scale commercial farmers under good management. The potential for increasing yields through crop improvement, and hence the total production in the region, is very high.

Diseases are considered to be the major constraints of groundnut production in all the SADCC countries except Botswana. The most economically important diseases are leafspots

(Cercospora arachidicola and Cercosporidium personatum) and rosette, an aphid transmitted virus disease.

The ICRISAT Regional Groundnut Program was started in 1982 by Dr. S.N. Nigam the Plant Breeder and, as the Pathologist post had not been filled, I was seconded from the ICRISAT Center Groundnut Improvement Program to visit the Regional Program during the 1982/83 cropping season for a period of three months (19 January to 25 April, 1983) to assist Dr. Nigam in the evaluation of ICRISAT germplasm and to initiate work on groundnut diseases in the Program.

2. OBJECTIVES

*To make an assessment of the laboratory and glasshouse facilities allocated to the unit and to prepare purchase orders for equipment, chemicals, glassware, spare parts etc. needed to set up an effective plant pathology laboratory.

*Evaluation of ICRISAT and Malawi groundnut germplasm and breeding lines for resistance to fungal and virus diseases.

*To carry-out preliminary disease surveys to assess the relative importance of various diseases of groundnut in Malawi.

*To locate areas for possible disease nurseries for evaluation of groundnut germplasm and breeding lines for disease resistance.

*To visit other SADCC countries to establish contacts with scientists working on groundnuts and to get acquainted with research being done there on groundnut diseases.

*To provide training in basic laboratory and field techniques, disease diagnosis, screening for disease resistance etc. to locally recruited staff.

3. ARRIVAL AND MEETINGS WITH MALAWI MINISTRY OF AGRICULTURE STAFF

I reached Lilongwe on 19th January 1983 via Harare. Dr. Nigam met me at the Kamuzu International Airport. Next day we visited the Ministry of Agriculture. Dr. J.T. Legg, Chief Agricultural Research Officer was on leave in the United Kingdom. We met Dr. H.K. Mwandemere, Ag. Chief Agricultural Research Officer and Mr. D.R.B. Manda, Principal Agricultural Research Officer. We drove to Chitedze Agricultural Research Station and met Mr. M.M. Chikonda, Ag. Station Officer. He gave me some general information about the station and the research activities.

I was introduced to the groundnut scientists, Mr. A.J. Chiyembekeza, Breeder, Mrs. P. Ngwira, Plant Pathologist, and Mr. C.E. Maliro, Agronomist. We discussed various aspects of groundnut cultivation and the major constraints of groundnut production in Malawi. They reckon that rosette, early leafspot (Cercospora arachidicola), and rust (Puccinia arachidis) are the

major diseases of groundnut in the country. They are in favour of ICRISAT participation and consider that breeding for resistance to these diseases would be a great help to the farmers in increasing groundnut production in Malawi. Dr. Nigam apprised me of the program activities and the collaborative research work which he had initiated with the scientists at the station.

4. THE CHITEDZE AGRICULTURAL RESEARCH STATION

Chitedze Agricultural Research Station is located 16 km west of the city of Lilongwe (Lat. 14' S, Long. 33 45'E; altitude 1050 M above sea) The station has a total land area of 562 ha, 60% of which is of high arable potential. The Lilongwe plain in which Chitedze is located has a tropical continental climate with a single rainy season from November to April. Annual rainfall ranges from 750 mm to 875 mm with a mean annual atmospheric temperature of 18 to 21 C. The main crops of maize, groundnut, and tobacco are grown in an eight-year-rotation composed of four years of cropping (maize, groundnut, tobacco) and four years Rhodes grass ley (Anon.1982). Crops are grown essentially under rainfed conditions, as the irrigation facilities on the farm are limited.

RESEARCH ON GROUNDNUT IN MALAWI

I have put together the following information on research on groundnut in Malawi from discussions with scientists in the ministry of agriculture and from consideration of various published papers (Chiyembekeza, 1982; Gibbons and Mercer, 1972; Mercer, 1974; 1977; 1978 a and 1978 b; Mughogho, 1968; 1969; Sibale and Kisyombe, 1980.)

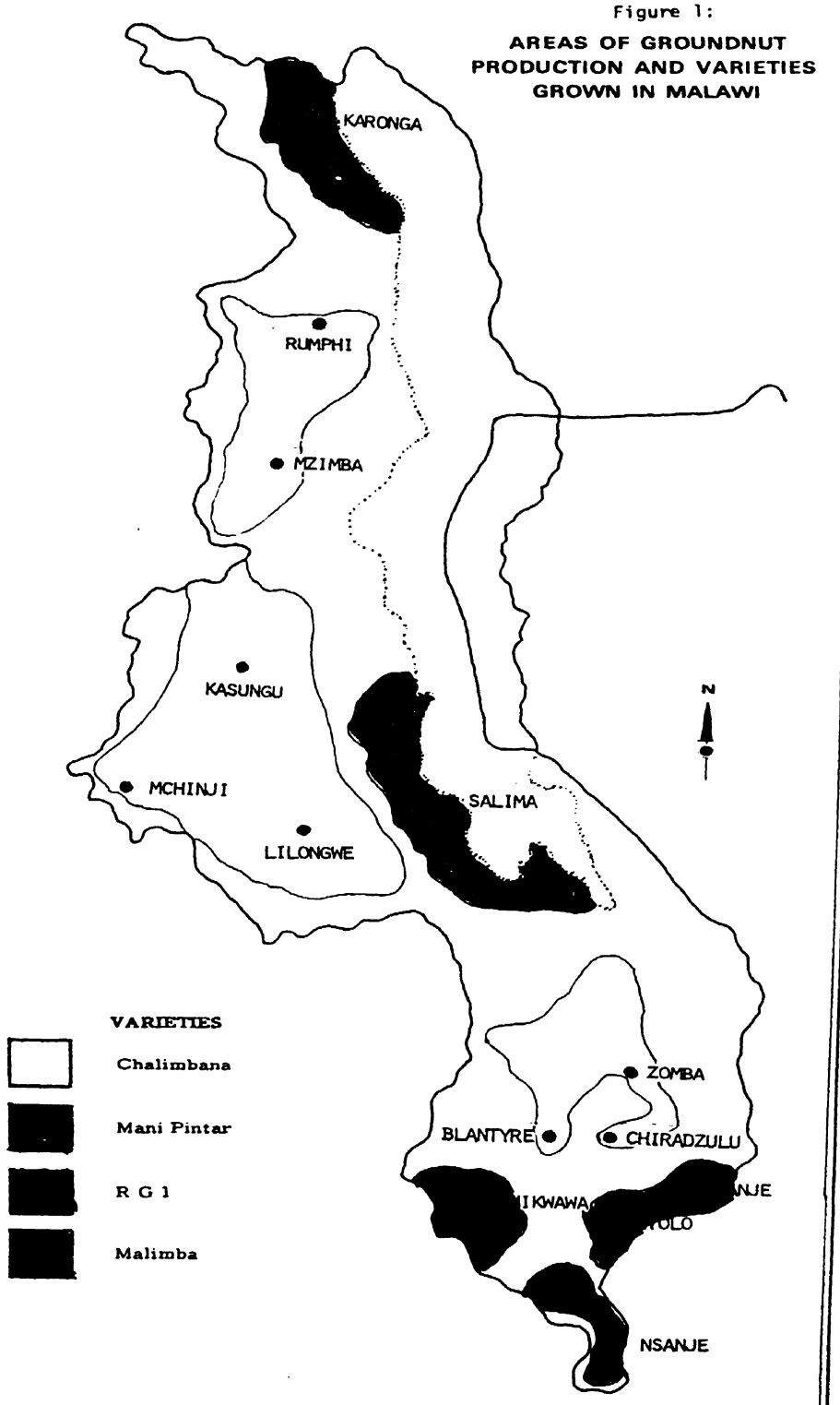
Groundnut is one of the most important crops in Malawi. It is mostly grown as a small-holder crop, both for food and for cash. Groundnut is generally grown in the altitude range of 200-1500 m above sea level with the majority in the Central Region (Lilongwe and Kasungu districts) at around 1200 m. Groundnut ranks fourth in export value after tobacco, tea and sugar, it is sold mainly for confectionary purposes.

Average yields of groundnut in Malawi are extremely low (700 kg/ha) compared to the yields of over 2500 kg/ha obtained in the developed world. The major contraints on groundnut production in Malawi are poor crop management practices, unreliable rainfall, and diseases.

Four main cultivars are grown in Malawi. Chalimbana is a long season (140-150 days) cultivar, a runner in growth habit with dark tan testa. Seeds are bold and this cultivar forms the basis of the confectionary export trade. It was introduced from the Eastern Province of Zambia and is recommended for all the plateau areas of Malawi. It has a yield potential of over 4000 kg/ha. It is susceptible to early leafspot and rosette diseases. Mani Pintar is also a long season (130-140 days) cultivar. It has a spreading bunch growth habit and has medium large, red and white variagated seeds. This cultivar was introduced from Bolivia via Australia and then Zambia. It is recommended for cultivation in the Lakeshore and the Upper Shire Valley areas. It has a yield potential of over 3000 kg/ha. It is susceptible to early leafspot and rosette. RG 1 is a long season (130-140 days) spreading bunch cultivar of the Castle Cary group, with medium-large, russet brown seeds. This cultivar was bred in Malawi for resistance to rosette and is recommended in areas of Thyolo and Mulanje districts where this disease is very serious. It susceptible to early leafspot and has a lower yield potential than Chalimbana and Mani Pintar. Malimba is an early maturing (110-120 days) Spanish bunch cultivar with small, light tan seeds. This cultivar is recommended in areas of the Chikwawa and Nsanje districts of the lower Shire Valley. It was introduced from the Gambia and is susceptible to early leafspot and rosette diseases. Areas of groundnut cultivation and the cultivars grown in Malawi are shown in Figure 1. Other promising cultivars are E 879/6/4 and SAC 58.

Figure 1:

AREAS OF GROUNDNUT PRODUCTION AND VARIETIES GROWN IN MALAWI



Rosette and early leafspot are considered to be the most important diseases of groundnut in Malawi. Late leafspot (Cercosporidium personatum) and rust normally occur towards maturity of the crop and are not economically important in the central region where most of the groundnut crop is grown. However, in the southern and northern regions of Malawi, late leafspot and rust cause severe damage to the crop. Other diseases such as Phoma leafspots, Leptosphaerulina scorch and pepper spots, crown rot, wilts and pod rots occur in Malawi but they are not economically important on a national basis. Research on fungicide control of groundnut diseases had been carried out for several years in Malawi and a number of contact and systemic fungicides have been evaluated. Sulphur dust was recommended for control of leafspots in the past. With the advent of rust in 1974/75 season, more new fungicides were evaluated and the contact fungicide Daconil 2787 is now recommended for the control of both leafspots and rust.

A number of cultural prctices like early planting, close spacing and maintenance of optimum plant stand have been recommended for minimizing the incidence of rosette.

Breeding for resistance to early leafspot and rosette is gaining importance in Malawi. A number of high yielding varieties with resistance to rosette (e.g. the RRI and RG 1 derivatives) have been developed and are in the final stage of evaluation. Resistance to early leafspot is lagging behind

because of the lack of appreciable levels of resistance to this disease in the available germplasm. Malawi scientists are very keen on collaborating with ICRISAT in this regard.

In general, insect pests are not considered to be economically important in Malawi. Aphis craccivora is more important as a vector of rosette disease than as a direct damage pest. Termites cause serious damage to the crop in some areas. Wilt (aetiology not known) of groundnut is gaining importance in parts of Malawi.

6. ESTABLISHMENT OF GROUNDNUT PATHOLOGY LABORATORY

During the first few days of my stay in Malawi with the help of Mrs. Ngwira I assessed the laboratory facilities allocated to ICRISAT groundnut program by the Ministry of Agriculture. Three office rooms for breeder, pathologist and secretary, and two laboratories are allocated to the program. There are no crop work area or storage facilities at present. There is no glasshouse formally allocated to the program, however, the available glasshouse facilities at the research station are being shared with other scientists. The glasshouses are very small but useful for pathology/virology and breeding research work. With some modification they could also be used for rearing aphids for rosette resistance screening work. The pathology laboratory allocated to the program is reasonably spacious but poorly equipped. The general pathology laboratory at the station is

well equipped with all basic requirements for research on fungal diseases (not for virus diseases). I have prepared lists of equipment, glassware, and chemicals required to initiate pathology work in the program. Dr. Nigam carried the lists to Hyderabad during his visit in February 1983 and discussed them with Drs. C.R. Jackson, Director (International Cooperation), D. McDonald, Program Leader (Groundnut), and D.V.R. Reddy, Principal Virologist, keeping in mind the available funds for purchase of equipment for the program. After a few additions and deletions the purchase orders are now being processed.

7. INVESTIGATIONS ON GROUNDNUT DISEASES

Investigations were carried out in collaboration with scientists in the Ministry of Agriculture on various aspects of fungal and virus diseases of groundnut and the results obtained are presented below.

7.1. FUNGAL DISEASES:

7.1.1. Leafspots:

Early leafspot (*Cercospora arachidicola* Hori.)
Late leafspot (*Cercosporidium personatum* (Berk & Curt.) Deighton).

Both leafspots are present throughout Malawi wherever groundnuts are grown, but, early leafspot is the more dominant and destructive. Leafspot disease symptoms are much influenced by host genotype and environmental factors. The colour of the lesion on the abaxial leaflet surface, light brown for C. arachidicola and black for C. personatum, and distribution of fruiting structures, on upper surface of the lesions for C. arachidicola and lower surface of the lesions for C. personatum, are useful characters for distinguishing between the two leafspots in the field. In addition to causing leafspots, the two pathogens also produce lesions on petioles, stems and pegs. Yield losses from leafspots are estimated to be high (up to 50%) and vary from year to year and by cultivar and location. Research has been carried out for several years in Malawi on control of leafspots by fungicides and on methods of fungicide application. Sulphur dust and benzimidazole compounds were first recommended but, in the light of recent investigations, Daconil 2787 is now being recommended in Malawi. Crop rotation and removal of volunteer plants and 'ground keepers' is recommended to farmers for reducing primary disease inoculum levels. At the present time there is no agronomically acceptable groundnut cultivar with resistance to early leafspot, although an interspecific hybridization program aimed at the transfer of resistance from wild Arachis species into the cultivated groundnut was initiated in 1968.

Search for perfect stages: It has been suggested that leafspot pathogens of groundnut perpetuate from season to season in

infected crop debris as perfect (Mycosphaerella) stages. I have examined over 200 infected fallen leaves collected from the ground below plants at various intervals during the crop season but no perfect stage was found. Species of Alternaria, Aspergillus, Cladosporium, Fusarium, Helminthosporium, Leptosphaerulina, Nigrospora and Rhizopus were commonly observed colonizing the leaf debris. Although Mycosphaerella stages of both leafspot fungi of groundnut have been described by Jenkins (1938), there is no further evidence of occurrence of these stages from any part of the world. At present we do not have any experimental evidence on the role of perfect stages in the perpetuation of leafspot pathogens.

Search for collateral hosts: Groundnut leafspot pathogens are known to infect several species within the genus Arachis. Mercer (1977) reported the occurrence of C. arachidicola on groundbeans (Voandzeia subterranea) in the Southern Region of Malawi. However, no information was provided in his publication on inoculation tests. I examined groundbeans grown at Chitedze station during the 1982-83 crop season but did not find any lesions of C. arachidicola on them. Inoculation studies were also carried-out in the glasshouse. Forty-day-old groundbean plants were raised in the glasshouse and inoculated with a conidial suspension (approximately 100,000 conidia/ml) of C. arachidicola multiplied on rooted detached leaves of groundnut (cv. Malimba). Plants were incubated at high relative humidity for two days in polythene chambers and then transferred to glasshouse benches. No symptoms of C. arachidicola were

observed even after 30 days of incubation. Groundnut (cv. Malimba) plants inoculated and incubated in a similar way developed severe C. arachidicola disease.

The inability of Cercospora canescens to infect groundnut: Cercospora canescens is a parasite of several leguminous crops. The fungus has also been reported associated with lesions of C. arachidicola and C. personatum in Nigeria (McDonald, 1966 personal communication to Jackson and Bell, 1969). It was also observed in a very few cases to be associated with lesions of C. personatum at ICRISAT center, Hyderabad, India. However, the infectivity of the fungus on healthy groundnut leaves was not examined.

The conidia of C.canescens, C.personatum and C.arachidicola are shown in figure 2.

Cercospora canescens was observed on groundbean (Voandzeia subterranea), cowpea (Vigna unguiculata) and beans (Phaseolus vulgaris) at Chitedze causing appreciable damage to the foliage. It was also observed associated with lesions of C. arachidicola on groundnut leaves and on decaying leaves of groundnut. Leaves of groundbeans (cv. Selection 43/1), cowpea (cv. Sudan) and beans (cv. Nasaka) infected with C. canescens were collected from the field, washed in running tap water and incubated for two day at high relative humidity in plastic trays. Conidia were collected by washing the sporulating lesion surface with a fine

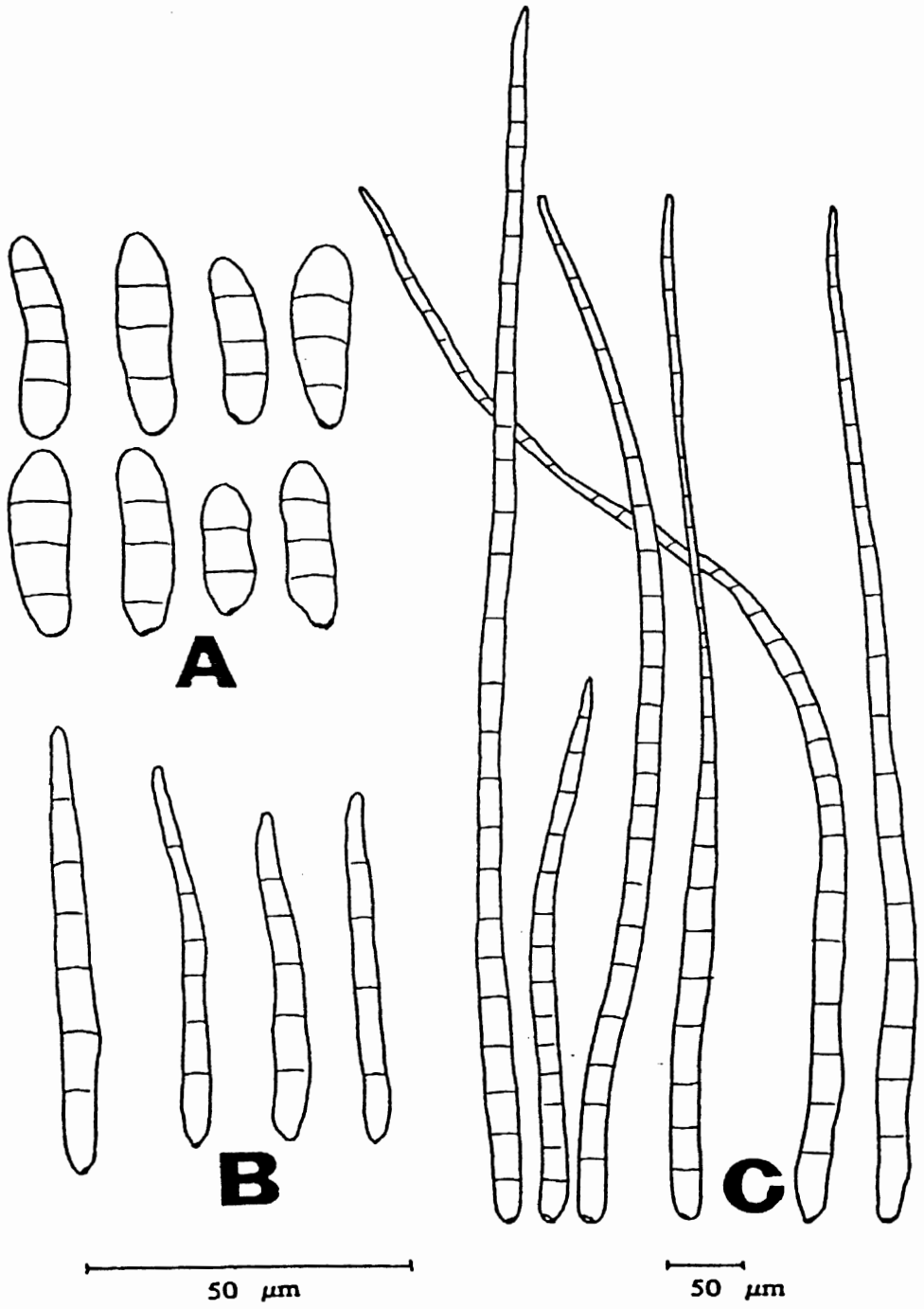


Fig. 2 : Conidia of *Cercosporidium personatum* (A), *Cercospora arachidicola* (B), and *C. canescens* (C).

jet of distilled water containing a trace of Tween 80 and inoculated onto the surfaces of healthy detached rooted groundnut leaves in a plastic tray (following the detached leaf technique developed at the ICRISAT Center, Hyderabad, India). Groundnut (cv. Malimba) leaves infected with C. arachidicola having C. canascens also on the lesions were collected from the field and incubated at high relative humidity for two days. Conidia of C. conescens were collected from the lesions of C. arachidicola with a fine needle to minimize contamination by conidia of C. arachidicola and inoculated onto the surfaces of healthy detached groundnut leaves. Ten leaves were inoculated with each isolate of C. canescens and inoculation tests were repeated twice. Leaves were observed until 25 days after inoculation but no disease development was observed. These results clearly show that C. canescens is not pathogenic to groundnut but may be associated with early leafspot lesions of groundnut, probably as a saprophyte.

Screening for resistance to Cercospora arachidicola: At the Chitedze Agricultural Research Station the occurrence of early leafspot is uniform and the disease regularly reaches epidemic proportions. This permits meaningful field evaluation of groundnut germplasm and breeding material for resistance to the disease. Late leafspot is much less common and disease levels are not normally high enough to permit meaningful resistance screening. Number of germplasm and breeding lines evaluated for resistance to C. arachidicola were as follows:

Test material	No. of entries
1. Germplasm - ICRISAT	606
2. Germplasm - Malawi	274
3. Breeding lines (Rust and late leafspot)	308
4. Breeding lines (High yield and quality)	504
5. Breeding lines (Earliness)	233
6. ICGS lines	50
Total	1975

All germplasm lines were grown in unreplicated rows of 6 m long. Most of the breeding lines were grown in unreplicated plots however, the number of rows varied from 2 to 14. The rows were 60 cm apart and seed to seed distance was 10 or 15 or 20 cm depending on the growth habit. Yield trials were planted in randomised block and lattice designs with at least three replications. All genotypes were evaluated for their reaction to C. arachidicola under natural disease pressure some 10 days before harvest using the 9 - point scale (1= no disease, and 9= extensive damage to the foliage). Percentage defoliation was estimated on central stems of five plants per plot using schematic diagrams depicting known percentages of leaflets lost. In some cases, though defoliation was severe, the lesions on the remaining leaflets were tiny and sporulation was extremely poor. In one case there was only slight defoliation but the lesions on

attached leaflets were large and with profuse sporulation. In such cases, the genotypes were further evaluated by measuring the following parameters:

Infection frequency: Total number of lesions on five randomly selected leaves per entry were counted. Leaf areas were estimated by comparison with diagrams of leaves of known areas. Infection frequencies were expressed as number of lesions/cm2 leaf area.

Lesion diameter: Measurement was made of the diameters of 10 lesions on each of five leaflets randomly selected from each genotype.

Sporulation: Five leaves were collected from each genotype and incubated on moist filter paper in plastic trays at 20 to 30 C under continuous illumination for 2 days. Lesions were then examined under a stereo microscope and the degree of sporulation was scored on a 5 - point scale (1=no sporulation and 5=extensive sporulation).

The results of screening of germplasm and breeding lines for resistance to C. arachidicola are presented in Appendices I, II and IV. Most of the germplasm and breeding lines showed extensive defoliation (70 to 100%) due to C. arachidicola. (Fig. 3A) However, some germplasm and breeding lines had less defoliation, lower infection frequency, smaller lesion areas and poorer sporulation. None of the entries combined all factors for

resistance. For example, ICG 8529 showed heavy defoliation (80%) and high infection frequency (20.5 lesions/cm square) but had only small lesions (2.5 mm diameter) with sparse sporulation (1.5 sporulation score) (Fig 3B). On the other hand, a breeding line, (TG3 x NC Ac 17090) F2-B2-B1-B2-B1-B1, showed reduced defoliation (55%) compared with susceptible check (Fig 3C) but lesion diameters and sporulation were comparable to those of susceptible cultivars (Table 1). There is an indication that these resistance components are governed by independent genes and may be operating independently. But possibilities exist to bring all these components of resistance together in one genotype by use of the convergent crossing method.

Fig. 3: A) Extensive damage to the foliage due to *Cercospora arachidicola*.

B) Genotype, ICG 8529 showing small lesions but high infection frequency.

C) Breeding line, (TG 3 x NC Ac 17090) F2-B2-B1-B2-B1-B1, showing reduced defoliation compared with susceptible genotype in foreground.

Table 1. Reaction of six groundnut genotypes to *Cercospora arachidicola*

Genotype	Components of resistance			
	Defoliation (%)	Infection frequency (Lesions/ cm)	Lesion diameter (mm)	Sporulation
ICG 5216	80	15.1	2.0	1.8
ICG 8528	85	19.2	2.2	2.0
ICG 8529	80	20.5	2.5	1.5
(TG 3 x NC Ac 17090) F2-B2-B1-B2-B1-B1	55	2.3	9.0	5.0
(NC Ac 17133-RF x TMV 2) F2-B-B1	90	1.2	9.2	5.0
Chalimbana (check)	85	3.0	8.5	5.0

Studies on disease progress: Development of C. arachidicola was studied on 40 groundnut genotypes (resistant to rust and/or late leafspot at ICRISAT Center, Hyderabad, plus C. arachidicola resistant lines reported from the USA) during the crop season. All genotypes were grown in unreplicated rows of 6m long. Five plants were selected at random for each genotypes and labelled. Their main stems were assessed for percentage defoliation and for the percentages of the area of remained leaves destroyed by C. arachidicola at 60, 75, 90, 105 and 120 days after planting. The percentage defoliation was calculated after counting abscissed and retained leaflets. The areas of retained leaves damaged by C. arachidicola were estimated by comparison of each mainstem leaf with diagrams depicting leaves with known percentages of their areas affected. The percentage defoliation (A) and the estimated percentages of leaf area damaged by C. arachidicola (B) and were used to calculate the remaining green leaf (RGL) percentage at different days after planting using the formula :

$$RGL = (100-A)-[(100-A) \times B/100]$$

The results are presented in Appendix III. There were significant varietal differences in defoliation, leaf area damage and percentage retained green leaf. Most of the genotypes tended to defoliate at an early stage in development, however, the genotypes PI 393516, NC Ac 17133-RF, C.No.45-23, NC Ac 17132 and Krap.St.16 showed less defoliation especially during the early stages of crop development (Appendix III and Figure 4).

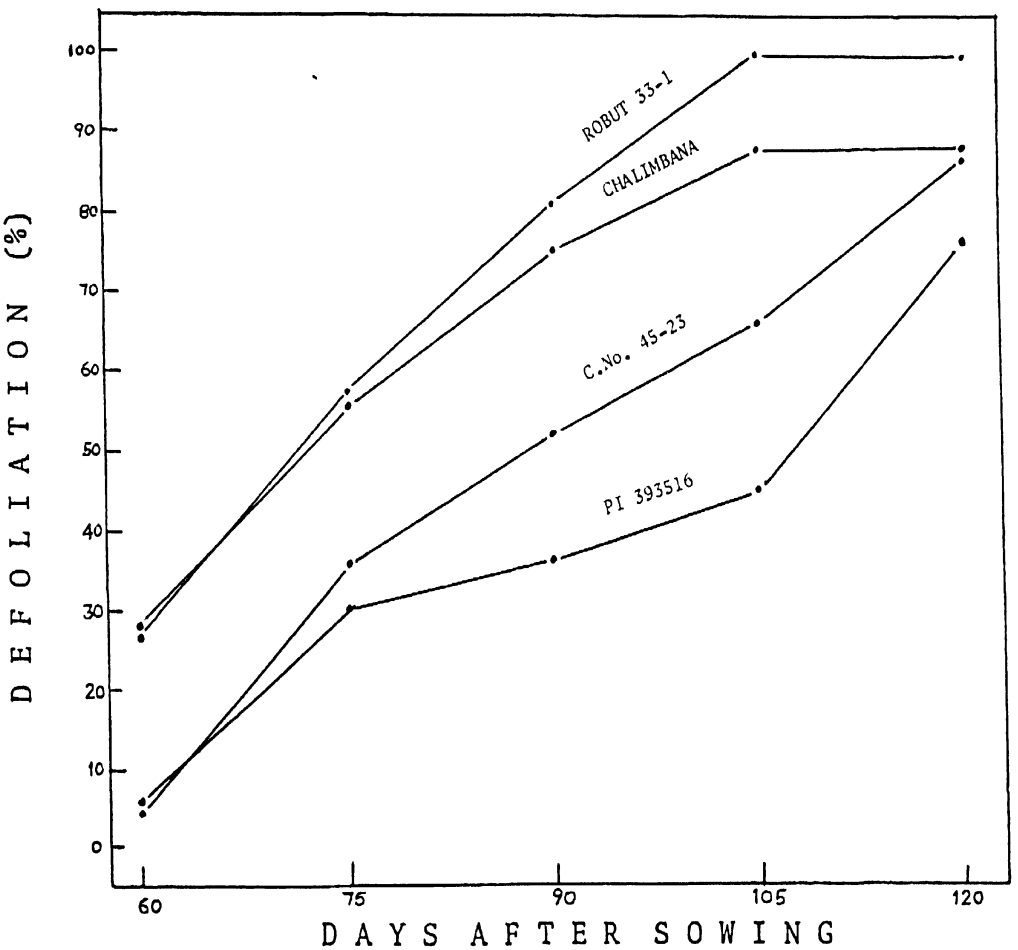


Fig.4: Percentage defoliation of four groundnut genotypes at different growth stages.

It is interesting to note that genotypes NC 3033, PI 270806, PI 259747 and PI 350680 which were reported to be resistant to C. arachidicola in the USA were found to be highly susceptible to early leafspot in field screening trials at Chitedze. There was no confusion in the identity of these germplasm lines as I checked such botanical characters as pod shape, kernal colour, branching habit, flower colour and stem colour and compared them with the germplasm records at ICRISAT Centre, Hyderabad. The variation in reaction of these genotypes to C. arachidicola between the two locations, Malawi and the USA, may be due to occurrence of more virulent strain(s) of C. arachidicola in Malawi. The differences appear to be too large to be attributed only to genotype x pathogen x environment interactions. Disease inoculum has been sent to cooperating scientists at Imperial College, University of London, to be compared with isolates from the USA for pathogenicity on a range of groundnut genotypes.

It is extremely important to evaluate all available germplasm and breeding lines, and especially interspecific hybrid derivatives, for resistance to C. arachidicola in Malawi.

7.1.2. Rust (Puccinia arachidis Speg.):

Previously unimportant outside the Americas, leaf rust is now of economic importance in almost all groundnut growing areas of the world. Rust was first observed in Malawi in the 1974/75 crop season. The disease is not considered to be economically important in the major groundnut growing Central Plain of Malawi

as the crop in this area has only been attacked late in the growing season. However, severe outbreaks of rust have occurred in the Karonga, Chitipa, Ngabu, Shire valley and Lakeshore areas of the country. In these areas yield losses from rust can be substantial and damage is particularly severe when the crop is attacked by both rust and leafspots. Foliar diseases control recommendations in Malawi have had to be modified as many of the fungicides which were recommended for control of leafspots do not control rust. A contact fungicide, Daconil 2787 is now being recommended for control of both rust and leafspots in Malawi.

I have examined many groundnut leaves infected with rust from different parts of Malawi but have found only urediniospores. Rust pustules were found to be commonly invaded by a species of Darluca.

As the rust disease pressure was not high at the Chitedze Agricultural Research Station, the germplasm and breeding lines were not evaluated for resistance to this disease. Rust is a serious problem on groundnuts in other countries of southern Africa(e.g. Mozambique and Tanzania). As the ICRISAT program has a regional mandate, it is important to advance and evaluate the breeding material generated at ICRISAT Centre for reaction to rust. This can probably be done in Karonga, Salima or Ngabu areas of Malawi where rust occurs in epidemic proportions. It is not advisable to develop any rust nurseries at the Chitedze Agricultural Research Station, where the emphasis should be on evaluating germplasm and breeding lines for resistance to C. arachidicola and rosette.

7.1.3. Pepper spot and leaf scorch (Leptosphaerulina crassiasca (Sechet) Jackson and Bell):

The disease is characterized by two distinct symptoms and is confined to the leaves. Symptoms of pepper spot appear as dark brown to black lesions, usually less than 1 mm in diameter, irregular to circular, and occasionally depressed. Discrete lesions over the leaflet are visible from both sides of the leaflet, however, lesions on the adaxial side appear more frequently. Lesions do not rapidly enlarge with age. When abundant, they tend to coalesce giving the leaflet surfac a netted appearance. In such cases leaflets soon die and production of numerous ascocarps (perithecia) occur in necrotic areas of abscised leaflets.

Leaf scorch symptoms frequently develop from the tips of leaflets, forming a wedge shaped lesion with a bright yellow zone along the periphery of the advancing margin of the lesion. The necrotic tissue becomes dark brown and tends to fragmentt along the leaflet margins, presenting a tattered appearance. Ascocarps of the fungus are abundant in the dead tissue (Jackson and Bell. 1969).

Pepper spot disease was occasionally observed at the Chitedze Agricultural Research Station. Symptoms were similar to that reported in the literature. Leaf scorch was commonly observed but was not causing appreciable damage to the crop. The commonest form of leaf scorch symptom was a 'v' shaped wedge at

the end of the mid-rib or on the margins of the leaflets. Leafspots caused by C. arachidicola were commonly present on the necrotic areas of the leaflet. At later stages, symptoms of C. arachidicola were masked due to the presence of fungi such as Phoma, Alternaria, Nigrospora, Cladosporium and Aspergillus. Leaf scorch symptoms were also commonly observed on leaflets which had been attacked by the groundnut jassid, Empoasca facialis. Ascocarps were present in large numbers in the dead tissue especially along the periphery of the lesion. It is interesting to note that the ascocarps of L. crassiasca were found in necrotic areas of leaves caused by chemical toxicity in some fungicidal trials on the farm. L. crassiasca was found to be a dominant coloniser of senesced leaves of groundnut in the field. It would be interesting to study the competitive saprophytic ability of this fungus in groundnut fields.

Isolation and inoculation tests: I have carried out some studied on pathogenicity of isolates of the fungus obtained from leaflets showing distinct pepper spot and leaf scorch symptoms. Infected leaves were collected from Lilongwe and Kasungu areas and L. crassiasca was isolated on potato dextrose agar (PDA). Five cultures isolated from pepper spot lesions and 12 cultures isolated from leaf scorch lesions were employed in pathogenicity tests. The isolates were multiplied on PDA and one month-old potted plants (cv. Chalimbana) raised in the glasshouse were inoculated with spore suspension using a plastic atomiser. Six plants were inoculated with each isolate. Inoculated plants were incubated at 100% relative humidity and 20-30 C for about two

days and then transferred to glasshouse benches.

All fungal cultures isolated from pepper spot lesions and three cultures isolated from leaf scorch lesions produced typical pepper spot symptoms within two weeks after inoculation. Lesions were dark brown and tiny. They did not enlarge in size and remained as tiny specks for several days but when the plants were transferred to humid chambers, the lesions tended to coalesce causing severe necrosis. The leaves become pale yellow and dropped. Ascocarps of the fungus were abundant in the dead tissues. None of the isolates produced typical scorch symptoms.

It is not clearly understood whether L. crassiasca can produce leaf scorch symptoms or factors associated with leaf scorch development in the field. In the present investigation, the isolates of L. crassiasca cultured from leaflets showing pepper spot and leaf scorch symptoms produced only pepper spot symptoms in artificial inoculation tests. In the field, leaf scorch was always associated with leafspots caused by C. arachidicola and jassid infestation of leaflets. It was never observed on otherwise undamaged leaves.

7.1.4. Wilts:

Termites attack groundnut plants just below the crown region and cause sudden wilting. Root grubs also invade groundnut roots and cause wilting, particularly in sandy soils. The diagnosis of these two types of wilts in the field is relatively easy. However, another type of wilt, known as 'slow wilt', is more

complicate and the reports on aetiology of this wilt are conflicting. The first symptoms of 'slow wilt' are the leaflets coming close together to lie parallel under conditions of water stress. The leaves gradually become yellow. Plants dug up at this stage showed roots with vascular discolouration. Lateral roots were frequently found rotted at their ends. Fusarium solani was observed commonly associated with the discoloured vascular tissues, however, it is reported that attempts to induce wilt symptoms by artificial inoculation with this fungus were unsuccessful (Mercer, 1978 b).

'Slow wilt' was commonly observed at the Chitedze Agricultural Research Station. In most of the fields, the wilt was observed to start at the edges of the field and subsequently progress towards the centre. In a few instances, wilted plants were randomly distributed in the field. We have lifted a number of wilted plants to examine the symptoms on the root. The symptoms were very similar to those described by Mercer (1978 b). In a majority of cases a sap-sucking bug, Hilda patruellis was found present around the root system. Black ants, Pheidole megacephala were also found wherever H. patruelis was found. F. solani was isolated consistantly from all the root samples. Pathogenicity tests were carried out with 8 isolates of F. solani on one month-old potted plants raised in the glasshouse, but no wilting occurred. The aetiology of 'slow wilt' is obscure and needs further investigation. It is important to study the role of H. patruelis and F. solani in 'slow wilt' of groundnut in collaboration with Entomologists.

7.1.5. Pod rot:

Gibbons and Mercer (1972) reported a pod rot of groundnut in Malawi. Symptoms varied from a slight rot of the pod surface to a complete detachment of the venation, leaving the remainder of the shell with a papery texture ('pod-breakdown'). A purple staining of the pod was also commonly observed. The disease was most serious in long wet seasons. Investigations have showed that control of leafspots reduced the incidence of pod rot (Mercer, 1978 a).

Pod rot was commonly observed at the Chitedze Agricultural Research Station on most of the varieties grown. However, the 'pod-breakdown' symptoms were rarely observed. In most of the cases the rotting of pods was assocated with damage caused by insects. Crops lifted at optimum maturity showed very low incidence of pod rot. However, crops left in the field beyond optimum maturity showed 80-100% discolouration of pod surfaces and rotting of kernels.

As the pod rot incidence was low at optimum maturity of the crop and the disease distribution in the field was not uniform, evaluation of germplasm and breeding lines for resistance to pod rot was not carried out.

7.1.6. Other fungal diseases:

Damping-off (Pythium myriotylum Drechsler), crown rot and collar rot (Aspergillus niger Van Tieghem), and Sclerotium stem rot and leaf blight (Sclerotium rolfsii Sacc.) were occasionally observed at the Chitedze Agricultural Research Station. Pathogenicity tests were conducted with fungi isolated from diseased plants and the cultures were deposited in the Commonwealth Mycological Institute (CMI), Kew, United Kingdom. The occurrence of Pythium damping-off of groundnut in Malawi appears to be a new record.

7.2. VIRUS DISEASES

7.2.1. Rosette:

Rosette is caused by a complex of two viruses, Groundnut Rosette Virus (GRV) and Groundnut Rosette Assistor Virus (VRAV) and is transmitted by Aphis craccivora Koch. (Hull and Adams, 1968). In Malawi, rosette virus disease appears in two forms, chlorotic rosette and green rosette, however, the chlorotic rosette is most widespread and destructive (Mercer, 1977). If the onset of disease is early, the entire plant becomes severely stunted, leaves become chlorotic and curled, (Fig 5) reducing pod formation drastically. Yield losses vary according to the time of infection during crop growth. Early infection leads to total loss of the crop. Rosette is considered to be extremely important throughout Malawi wherever groundnuts are grown. Severe epidemics of rosette are of common occurrence in Phalombe

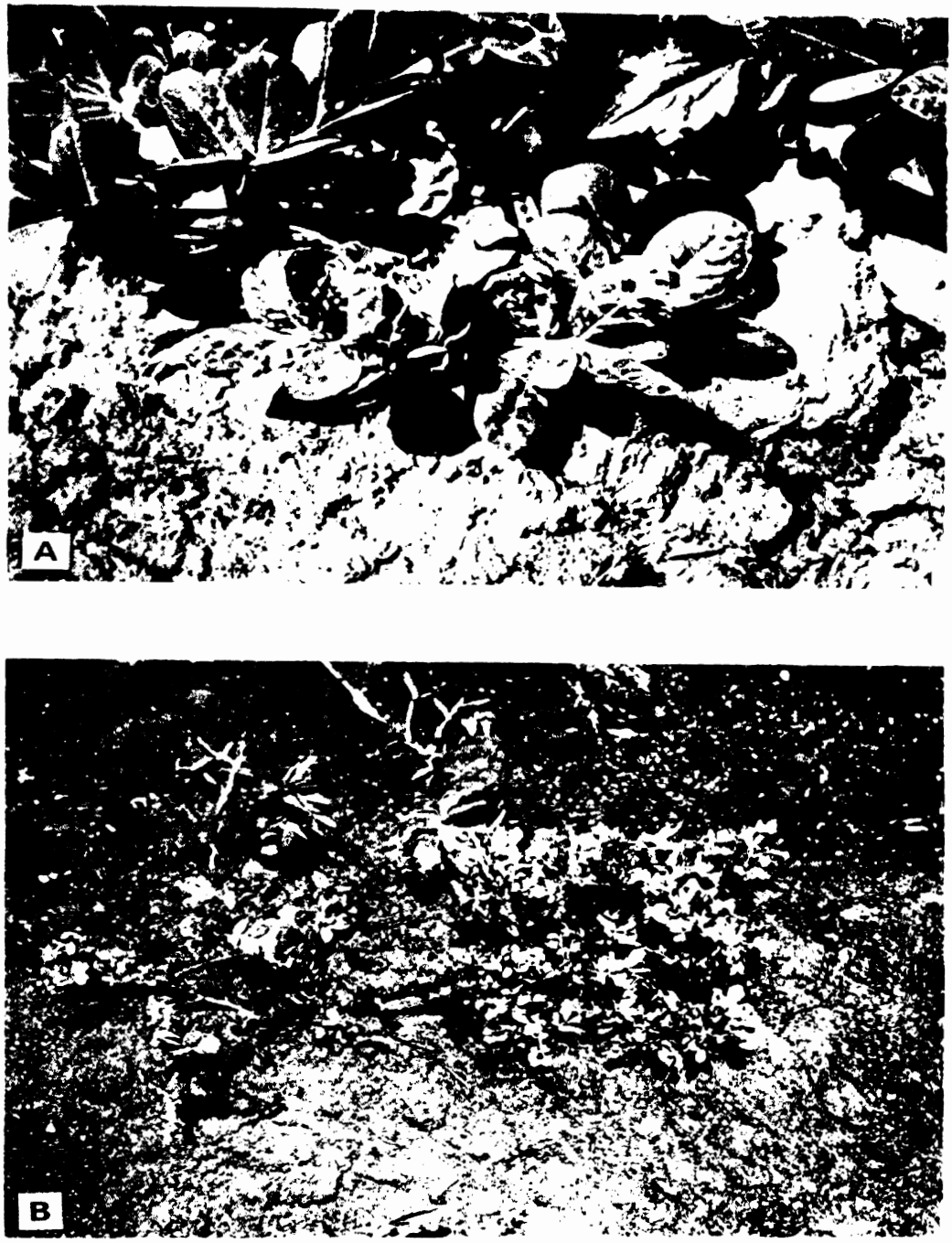


Fig. 5: Symptoms of rosette disease. A) Early symptoms and B) severe symptoms.

region in Southern Malawi.

Spraying of crop with suitable insecticides has been shown to reduce the disease spread. Early planting and maintenance of optimum plant stand in the field have been recommended to the farmers in Malawi to reduce rosette incidence. Breeding for rosette disease resistance was initiated in Malawi in 1964 and has resulted in development of many resistant varieties (e.g. RG 1 and RR 1 derivatives). The variety RG 1 is now grown in Southern Malawi on a commercial scale.

Effect of time of planting on rosette disease incidence: As I reached Malawi after planting of groundnut in December, I could not plan a detailed experiment to investigate the effect of time of planting on incidence of rosette disease. Observations were made on unreplicated seed multiplication plots of the cultivar Chalimbana (susceptible to rosette). Seeds were sown on 10 December 1982 (normal planting) and in mid-January, 1983 (late planting). Both plots were located in the same field. The total number of plants present and the number of rosette virus infected plants were counted in each plot at maturity and percentage incidence of rosette estimated. Late planting has resulted in almost 100% incidence of rosette (Table 2). These observations suggest that by delaying planting, screening of germplasm and breedins lines for resistance to rosette can be carried out effectively at Chitedze Agricultural Research Station.

Table 2: Effect of time of planting on incidence of rosette virus disease at the Chitedze Agricultural Research Station, Lilongwe, Malawi, 1982-83 crop season.

Time of planting	Total number of plants in the plot	% rosette incidence		Total incidence (%)
		Early infection	Late infection	
10 December, 1982 (normal planting)	1853	2.4	19.7	22.1
Mid January, 1983 (late planting)	2145	74.6	22.7	97.3

Screening for resistance to rosette: Considerable variation in rosette incidence was observed on the farm during the 1982/83 crop season. As most of the trials were planted during the first fortnight of December, 1982 (normal planting), the disease incidence was low. The rosette disease occurred in patches, hence many germplasm and breeding lines could not be evaluated for resistance to it. Fortunately, in one of the fields where Malawi germplasm lines (maintained at Chitedze by scientists in the Ministry of Agriculture) were planted, there was a good disease build up, and germplasm lines, planted mostly in unreplicated single row plots, were evaluated for resistance to rosette in collaboration with Mr. Chyembekeza and Mrs. Ngwira. Healthy and rosette affected plants present in each row were counted at maturity and the percentage incidence of the disease was calculated (Appendix IV). It is interesting to note that some of the lines did not show any incidence of rosette. (Fig. 6) The plants were apparently healthy. There was no stunting of plants and leaves were generally free from symptoms of rosette, however, at maturity some of the youngest leaves showed chlorotic symptoms. Germplasm lines which showed less than 10% rosette incidence are listed in Table 3.

Fig. 6: A) Screening of groundnut germplasm for resistance to rosette disease at the Chitedze Agricultural Research Station, Lilongwe, Malawi, 1982/83.

B) A breeding line, RG 1/2 developed by scientists in the Ministry of Agriculture, Malawi, showing good performance against rosette.

Table 3 : Screening of groundnut germplasm for resistance to rosette at the Chitedze Agricultural Research Station, Lilongwe, Malawi - 1982/83.

Line No.	Genotype	No. of plants examined	No.of Plants with rosette disease	Disease incidence
1.	RG1/48	29	0	0
2.	RG/18	36	0	0
3.	RG1/3	36	0	0
4.	RG 11	30	0	0
5.	RMP 11	23	2	8.7
6.	RMP 49/2/1	35	0	0
7.	RMP 49/6	29	0	0
8.	RMP 49/B	22	0	0
9.	RMP 49/5	35	0	0
10.	RMP 49	23	0	0
11.	RMP 40	35	0	0
12.	RMP 49/2/2	34	0	0
13.	Bambay 48-37	35	0	0
14.	Bambay 48-35-2	37	0	0
15.	Bambay 48-36	38	0	0
16.	Bambay 487 Ex.S.R.	31	3	9.7
17.	Bambay 48-21	30	0	0
18.	B224/RR/5/B1/ SPS1/1	19	0	0

19.	B222/RR/6/1/ B1/1	28	0	0
20.	B222/RR/5/6/1	13	0	0
21.	B222/RR/1/1/ B1/1	16	0	0
22.	RRI/1	44	0	0
23.	RRI/12	35	0	0
24.	RRI/4	43	0	0
25.	RRI/22	34	0	0
26.	RRI/25	40	0	0
27.	RRI/6	33	0	0
28.	RRI/16	42	0	0
29.	RRI/31	40	0	0
30.	RRI/23	29	2	6.9
31.	RRI/5	35	0	0
32.	RRI/14	27	0	0
33.	RRI/29	7	0	0
34.	RRI/8	37	0	0
35.	RRI/21	32	0	0
36.	RRI/18	37	0	0
37.	PR 64 B	18	1	5.6
38.	PR 65 B	36	2	5.6
39.	PR 43 B	33	0	0
40.	PR 49 B	16	0	0
41.	PR 59 B	17	0	0
42.	PR 30 B	28	0	0
43.	PR 46 B	20	0	0
44.	PR 47 B	30	1	3.3

45.	PR 29 B	33	0	0
46.	A 1366	9	0	0
47.	A 1373	37	0	0
48.	A 1368	8	0	0
49.	M 5	34	2	5.9
50.	M 14	36	2	5.6
51.	C 17	21	2	9.5
52.	488	33	1	3.0
53.	489	20	0	0
54.	AP 205 Spanish	35	2	5.7
55.	Holland Station Jumbo	36	3	8.3
56.	U/AlBSl	32	0	0
57.	U/A 15B 717	32	2	6.3
58.	U/A 7B 353	38	2	5.3

Susceptible check cultivars:

59.	Makulu Red	33	33	100
60.	Chalimbana Sel.	30	28	93.3
61.	SAC 63	27	27	100
62.	Dixie Runner	36	36	100

We also evaluated 300 interspecific hybrid derivatives for resistance to rosette. These lines were received from ICRISAT Center, Hyderabad, in the third week of January 1983 and were planted in the fourth week of January 1983. As the planting was very late, there was severe development of rosette. None of the genotypes showed resistance to the disease (Appendix V).

Breeding for resistance to rosette has been given high priority in Malawi and the research initiated by the Agricultural Research Council has resulted in cultivars like RG 1, which is now recommended for cultivation in parts of southern Malawi. I was delighted to see the good performance of RG 1 in farmers' fields during disease surveys in the Phalombe region. In some fields I visited there was over 50% incidence of rosette on the cultivar Chalimbana but RG 1 was free from the disease. Probably this is one of the best available examples of how a program for breeding for disease resistance can help farmers in developing countries. There is a continuing effort to develop more high yielding cultivars with similar resistance to rosette and a large number of high yielding large seeded, rosette resistant varieties are being developed at the Chitedze Agricultural Research Station. (Fig. 6B) They are now being tested in different parts of Malawi for their performance against rosette and will soon be available to farmers. These lines could be tested for their performance in other countries in southern Africa, if they were made available to the ICRISAT Regional Program.

7.2.2. Peanut mottle virus (PMV):

PMV was observed on all the experimental crops on Chitedze Agricultural Research Station. Infected plants showed severe mosaic mottling on younger leaflets. The edges of the older leaves were rolled inward and had interveinal depressions. (Fig. 7A) Mosaic mottling was not apparent on older leaves unless they were observed in the shade. Infected plants were not severly stunted. Dr. D.V.R. Reddy (ICRISAT Principal Virologist on visit to Malawi) and I have conducted some inoculation studies with the help of Mrs. Ngwira and Mr. Nyirenda. Extracts were prepared in chilled 0.02 M sodium phosphate buffer containing sodium sulphate, DIECA and bentonite. These salt mixtures were brought by Dr. Reddy from ICRISAT Centre, Hyderabad. Five cowpea cultivars(TVX 1836 - OBJ, S 16, TVX 4072 - 0180, Mwazisa and Sudan) and 3 bean cultivars (Kenzama, Canadian wonder and 253/1) were used in inoculation tests. Plants were kept in the dark for 2 days before being inoculated. Grafting inoculation was also carried out on a groundnut cultivar, Malimba. Typical chlorotic lesions were observed on all three bean cultivars. Graft inoculation was also positive. Dr. Reddy took fixed PMV disease samples (virus inactivated and presenting no quarantine problems) to ICRISAT Centre for further investigations. Serological tests and electron microscope examination of thin sections confirmed the presence of PMV.

7.2.3. Tomato spotted wilt virus(TSWV):

TSWV was occasionally observed on groundnut trials at the Chitedze Agricultural Research Station and also in farmers fields in parts of southern Malawi. Infected plants showed extensive chlorotic rings interspersed with mosaic mottling. (Fig.7B) Plants did not show any necrosis of terminal buds, stunting and proliferation of axillary shoots. In mechanical transmission tests, cowpea and bean cultivars were not found infected. However, virus particles resembling TSWV were detected in thin sections examined with the electron microscope. It appears that the TSWV strain occurring in Malawi is distinct from the one in India.

7.2.4. Cowpea mild mottle virus (CMMV ?):

Diseased plants showed characteristic vein-clearing of young leaves, vein banding and outward curlilng and necrosis of older leaves. Plants were severely stunted. Studies on mechanical transmission of the disease on bean (cv. kanzama) showed the development of brown spots surrounded by chlorotic irregular halos. Lesions were prominent on upper leaf surface. The material was not processed for serological tests and electron microscopy. The incidence of this disease was negligible.

Fig. 7: A) Symptoms of peanut mottle-virus disease.

B) Symptoms of tomato spotted wilt virus on groundnut.

8. DISEASE SURVEYS AND VISITS

8.1. A survey of diseases of groundnut in the South and Central Regions of Malawi, 14-16 April, 1983

(This information has been seperately issued in Malawi as a report by Mrs. P. Ngwira and Mr. A.J. Chiyembekeza of the Grain Legumes Improvement Programme of Chitedze Agricultural Research Station Lilongwe, Malawi and P. Subrahmanyam, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru P.O., Andhra Pradesh-502 324, India)

Introduction

Groundnut is an important crop in Malawi contributing to the vegetable protein needs of the population and ranking fourth after tobacco, tea and sugar as an export crop. The produce exported is mainly for confectionary use and so has to be of high quality. Groundnuts are grown by small scale farmers at altitudes ranging from 200 to 1500 m. The bulk of the crop (upto 70%) is produced in the Central region (Lilongwe and Kasungu districts) at an average altitude of 1200 m. Yields are low, averaging 700 kg/ha of dried pods. The major constraints on groundnut production in Malawi are poor crop management practices, unreliable rainfall and diseases.

Disease of groundnuts in Malawi have been listed by various workers (Wiehe, 1953; Corbett, 1963; Mughogho, 1969; Peregrine and Siddiqui, 1972; Mercer, 1977, 1978 a and b). In all these publications most emphasis has been placed on fungal diseases and very little information is given on the occurrence of virus diseases other than rosette. The groundnut disease situation has changed in recent years with the arrival of rust disease. The present survey was undertaken with the following objectives:

*To obtain information on various fungal and viral diseases of groundnut in parts of South and Central regions of Malawi.

*To assess their relative importance in different parts of Lilongwe, Blantyre, Liwonde, and Salima Agricultural Development Divisions (ADD).

*To identify 'hot-spots' for evaluation of germplasm and breeding lines for disease resistance.

Itinerary:

April 14, 1983 : Lilongwe-Kasalika-Bango-Mbela-Mwenje-Mphunda-Nnunkhaludzu-Mbuta-Nsipe-Phalula-Blantyre.

April 15, 1983 : Blantyre-Bvumbwe-Chabwela-Khogolo-Kasongo-Naminjiva-Matekenya-Namalwa (In Phalombe Project)- Zomba.

April 16, 1983 : Zomba-Makoka-Malosa-Chamba-Nsanama-Chitala (Salima)-Lilongwe.

Disease survey methods:

The procedure followed by ICRISAT groundnut pathologists for disease surveys in India and other groundnut growing countries in the world, was adopted. Disease survey routes were carefully planned prior to departure keeping in mind the extent of groundnut cultivation in the areas to be visited. As far as possible, we tried to cover the most important villages in each Agriculture Development Division (ADD) where groundnuts are extensively cultivated. Fields located adjacent to roads were surveyed. In some cases, fields not accessable by road but close to roads were covered on foot. A distance of approximatelyl 10 km was maintained between survey sites. Details of field, soil type, cropping systems, groundnut cultivar, plant stand and growth stage of the crop were recorded. Crop protection information such as, chemicals used, dosage and number of sprays applied was obtained wherever possible from the farmers. The occurrence of various fungal and viral diseases was recorded. The severity of foliar diseases was recorded by estimating the approximate levels of defoliation and the areas of remaining green leaf. The incidence of viral diseases and wilts was estimated by counting the number of healthy and diseased plants per unit area. Disease affected areas of fields were mapped on a graph paper. Information on pod rots and nodulation was also obtained on randomly uprooted plants. In addition, information on Alectra (a phanerogamic root parasite), insect pests, and weeds was also collected at each survey site. Disease samples were collected from some locations for laboratory examination. A total of about 1400 km was covered during this survey trip (Figure 8).

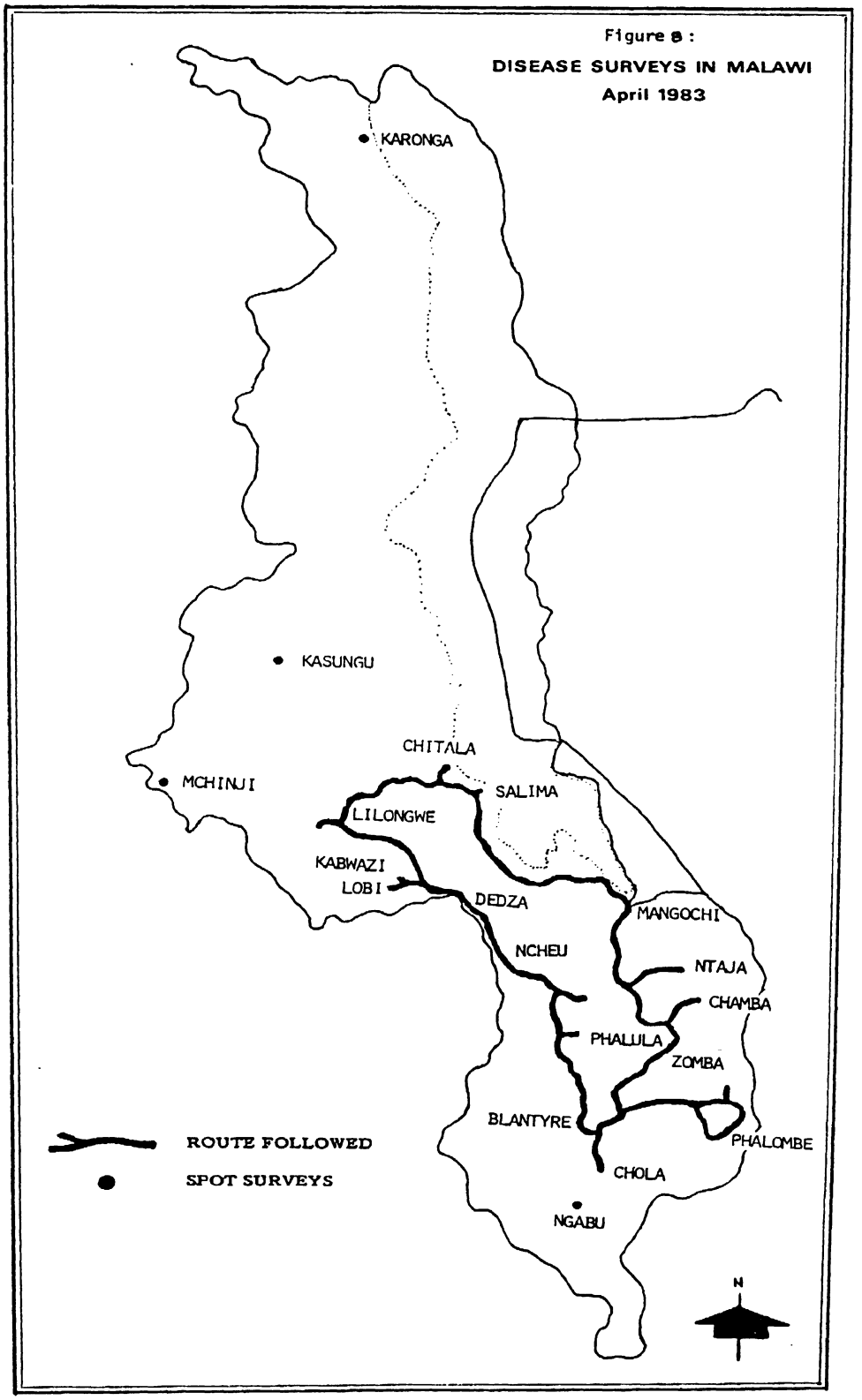


Figure 8 :
DISEASE SURVEYS IN MALAWI
April 1983
KARONGA
KASUNGU
CHITALA
MCHINJI
SALIMA
LILONGWE
KABWAZI
LOBI
DEDZA
MANGOCHI
NCHEU
NTAJA
CHAMBA
PHALULA
ZOMBA
BLANTYRE
PHALOMBE
CHOLA
NGABU
ROUTE FOLLOWED
SPOT SURVEYS
N

Situation of groundnut diseases

Lilongwe ADD: Groundnuts are grown quite extensively in Lilongwe North-east, Ntcheu and Thiwi/Lifidzi Rural Development Project areas of Lilongwe ADD, often as a mixed crop with maize, sweet potato, bambara nuts, cowpeas, cucurbits, etc. Soils were mostly sandy and were well suited for groundnut cultivation. Chalimbana is the most popular variety in all these project areas, although, a mixture of Kalisele, Asyria Mwitunde, Amani and Mani Pintar varieties with Chalimbana was often observed in farmers' fields. The crop was nearing maturity at the time of survey.

Rosette was found to be the most important disease of groundnut in Lilongwe ADD. The disease incidence varied from 50 to 90% and the plants were severly rosetted resulting in reduction in pod number, to 2 to 3 pods per plant. The situation was particularly serious in late planted (end of December) crops with very wide spacing (over a meter), leading to 100% incidence. In such cases it was evident that farmers would not even recover their seed material. Though early planting (end of November), close spacing (90 cm between rows and 15 cm between stations), and maintanance of optimum plant stand in the field has been recommended to minimise the incidence of rosette, it was observed that the recommendations were not being adopted by the farmers.

Early leafspot (Cercospora arachidicola) was found to be the second most important disease of groundnut in the Lilongwe ADD causing severe defoliation ranging from 75 to 100%. Late

leafspot (Cercosporidium personatum), rust (Puccinia arachidis), web blotch (Phoma arachidicola), Phoma leafspot (Phoma sp.) stem rot (Sclerotium rolfsii), pod rots, Peanut Mottle Virus (PMV) and Cowpea Mild Mottle Virus (CMMV) diseases were also present but were not causing severe damage to the crop. A root wilt of groundnut was commonly observed in parts of this ADD. Wilted plants were more common round the edges of the fields than in the centre. The etiology of this problem is not known. It is however, believed to be due to a sap-sucking bug, Hilda patruellis, which feeds on the root system. Several wilt affected plants were examined at Chitedze Agricultural Research Station. The plants dug up at early stages of wilting showed rotting of the tap root and at the tips of lateral roots and browning of vascular tissues. Fusarium solani was isolated consistently from all diseased root tissues. However, pathogenicity of this fungus in artificial inoculation tests could not be established. It is important to determine the role of H. patruellis and F. solani in causing wilt of groundnut plants.

Alectra sp. (family:Scrophulariaceae) a phanerogamic root parasite of groundnut, (Fig. 9) was also found to be serious in some fields in the Lilongwe North-East and Thiwi/Lifidzi project areas, and probably caused considerable yield reductions. The incidence varied from 5 to 90%.

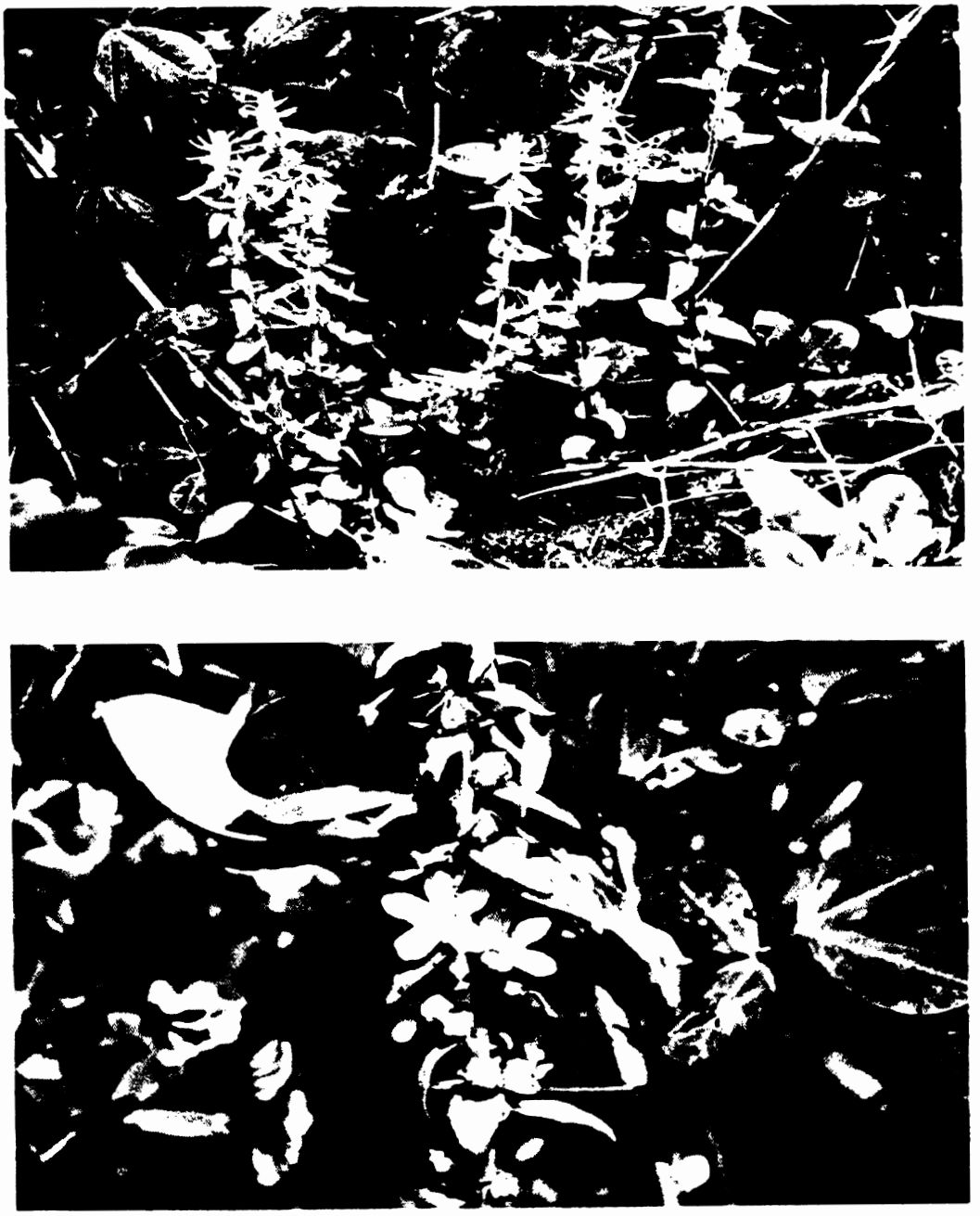


Fig. 9: *Alectra* sp. (family: Scrophulariaceae), a phanerogamic root parasite of groundnut in Malawi.

Termites and jassids were commonly observed but not in serious proportions.

Species of Acanthospermum, Lucas, Corchorus, Nicandra, Pilosa, Vernonia and Ocimum were commonly observed as weeds competing with groundnut crop.

In general, nodulation was extremely poor.

We visited an experimental trial on "The effect of time of planting on performance of groundnut cultivars at Nsipe area being conducted by Mr. Charles Maliro, Groundnut Agronomist at Chitedze Agricultural Research Station. The trial was well laid out but badly hit by drought. It was interesting to note that the incidence of groundnut rosette was relatively low (37%) in early planted plots but 100% in late planted plots. Early leafspot and rust diseases were found to be serious in the experimental plots and also in farmers' fields in Nsipe area of Ntcheu Rural Development Project. Stem rot and pod rots were also observed but were not serious.

Blantyre ADD: We visited farmers' fields in parts of Chiradzulu and Phalombe Rural Development Project areas. Groundnuts are grown to some extent in these areas, often as a mixed crop with sorghum, pigeonpea, sweet potato, maize and cassava. Soils were mostly of sandy type. Chalimbana was the most popular variety in Chiradzulu project area while both Chalimbana and RG1 varieties were grown in Phalombe project area. The crop in both areas was

nearing maturity.

A clear-cut shift in disease spectrum was observed as we travelled from Lilongwe ADD to Blantyre ADD. Rust was more serious in parts of Blantyre ADD causing extensive damage to the foliage. In many fields only withered stems were observed. Both Chalimbana and RG 1 cultivars are highly susceptible to rust. Rosette is also very important in Blantyre ADD, particularly in the Phalombe plain. We visited groundnut fields at Kasongo Extension Planning Area in the Phalombe Rural Development Project, where Chalimbana and RG1 were planted adjacent to each other for demonstration to the farmers. We were delighted to see the resistance of RG1 to rosette. There was about 50% rosette incidence with severe stunting in Chalimbana but RG1 was apparently free from rosette. On careful examination however, we found some plants of RG1 showing very mild mottling symptoms of rosette on the extreme top leaves. Similar symptoms had also been observed on many rosette resistant germplasm and breeding lines at Chitedze Agricultural Research Station (1982/83 crop season). RG1 is not immune to rosette but appears to have a very high level of resistance to the virus. There was no deformity of leaves and stunting in RG1. RG1 was also observed in the farmers' fields on this plain. Its resistance to rosette disease was extremely good.

RG1 was bred at Chitedze Agricultural Research Station in the 1960's by scientists in the Agricultural Research Council. Probably this is one of the best available examples of how a program for breeding for disease resistance can help farmers in developing countries.

Wilt was also an important problem in these areas. There was 90 to 95% incidence of wilt in some farmers' fields and on an experimental trial ("National Varietal Trial") planted in Matekenya village by Mr. A.J. Chiyembekeza, Groundnut Breeder of Chitedze Agricultural Research Station. Early leafspot, late leafspot, pepper spot, Phoma leafspot, pod rots, peanut mottle virus (PMV) and Tomato Spotted Wilt Virus (TSWV) were also observed but were not causing appreciable damage to the crop. Alectra was also found in fields near Naminjiwa, Matekenya and Namalwa villages but was not serious. Termites, thrips and jassids were commonly observed in these areas. In general nodulation was good. Most fields were well maintained in this area.

Liwonde ADD: Groundnut is not an important crop in Liwonde ADD. We visited parts of Balaka, Zomba and Kawinga Rural Development Project areas where groundnuts are grown to a limited extent. Groundnut plots were very small and Chalimbana was the most popular variety.

Extensive damage to the crop due to the combined attack of rust and late leafspot was observed but early leafspot was rare. Rosette disease was particularly serious (up to 50% incidence) in Chamba village. In other areas the incidence varied from 5 to 15%. Pod rots were commonly observed at Malosa Extension Planning Area but damage was not serious. A severe wilt disease was observed in Phalula area of Balaka Rural Development Project but since the crop was over mature and badly hit by drought, we could not diagnose the cause of the wilt. The soil was deep vertisol and was found not suitable for groundnut cultivation.

We also visited a groundnut varietal trial at Makoka Agricultural Research Station situated near Zomba. The crop was very severely affected by rust and late leafspot. Stem rot and wilt diseases were also commonly observed.

Salima ADD: Groundnuts are grown in parts of Salima Lakeshore Rural Development Project areas but we did not visit many farmers' fields as the crop had already been lifted. However, we examined groundnut trials at Chitala Agricultural Research Station. The disease situation was highly variable. In some fields early leafspot was found to be very serious while in others rust was a major problem. It was also noted that jassid damage was widespread and serious in all the trials visited. The incidence of rosette was not high probably because of early planting and optimum plant stand in the field. PMV was commonly observed, however, as the crop had already reached maturity, it was difficult to estimate the levels of damage to the crop.

Other Locations: Groundnut growing areas in other parts of Malawi were also visited earlier in the season including Kasungu, Mchinji, Karonga and Ngabu. Our observations were mostly limited to crops on the experimental stations. Rosette and early leafspot were important in Kasungu and Mchinji areas while rust and late leafspot were extremely serious in Karonga and Ngabu areas. Root grubs were found causing considerable damage to the crop in parts of Kasungu, particularly in sandy soils.

We interviewed farmers in most of the sites visited during this survey trip to obtain information on various aspects of groundnut production. It was interesting to learn that over 90% of the farmers interviewed used their own seed which was in most cases not pure - a mixture of Chalimbana, Asyria Mwitunde, Kalisele and even Mani Pintar and Amani. Most farmers did not use any fertilisers. Although information is available on the control of diseases by chemicals and by cultural methods, farmers had not adopted these because of various reasons.

RESEARCH PRIORITIES:

Based on our observations on the current situation of groundnut diseases in the farmers' fields and information available from various research reports published from time to time, we consider that rosette and early leafspot are the most important diseases of groundnuts in Malawi. They are present throughout the country wherever groundnuts are grown and are

particularly devastating in the Central region of Malawi (Lilongwe and Kasungu) where most of the groundnuts are produced. Rust and late leafspot diseases are not serious in these areas but are extremely important in the Southern and Northern parts of the country. Wilt has now become important in some areas of Malawi. In addition a number of other fungal and viral diseases of groundnuts occur in Malawi but at present they are not considered to be economically important.

Excellent information is available on the control of rosette, leafspots and rust in Malawi. Rosette disease can be controlled by adopting early planting, close spacing and maintaining optimum plant stand in the field. Control of aphids, the vector of rosette virus, will also help in minimizing the secondary spread of the diseases. Leafspots and rust could be effectively controlled by spraying with fungicides like Daconil 2787. These aspects have been thoroughly investigated by scientists in various research stations in the country but their recommendations are not being followed by the majority of the groundnut growers in Malawi. As most of the groundnuts are grown on small holdings it can often be difficult to apply such inputs as chemical control. Hence, we feel that breeding for resistance to these diseases is probably one of the best ways to boost groundnut production in Malawi.

Research on rosette resistance was initiated at Chitedze Agricultural Research Station in the 1960's which resulted in the development of cultivars like RG1. This cultivar is recommended for use in the Southern parts of the country. However, RG1 does not attract premium prices in the export market as it is only of medium seed size. Recently several large seeded lines with rosette resistance have been developed in the breeding program at Chitedze and these are being tested in different parts of the country for their yield potential and adaptability. It is extremely important to evaluate this material on a priority basis and if they prove successful to make them available as soon as possible to farmers in Malawi.

Research on breeding for resistance to early leafspot, late leafspot and rust has not received much attention from scientists in Malawi. All groundnut cultivars currently being grown in Malawi are susceptible to these diseases. Progress has been made at ICRISAT Center, Hyderabad, India on developing breeding populations with resistance to rust and late leafspot. These lines are now available with the ICRISAT Regional Groundnut Programme for Southern Africa stationed at Chitedze, and are being evaluated under local conditions in collaboration with scientist at Chitedze. Crosses between rosette resistant varieties and late leafspot and rust resistant lines have been initiated jointly by the ICRISAT Regional Program and scientists at Chitedze to develop varieties with multiple disease resistance.

Screening for resistance to rosette could be carried out in any part of Malawi as the disease is serious throughout the country. However, late planting (mid January) and wide spacing should be adopted to get maximum disease incidence. Early leafspot resistance could be evaluated in the Central region where interference from rust and late leafspot is not important. Screening for resistance to late leafspot and rust could be meaningfully carried out in either the Southern or the Northern regions. However, early planting (end November) is important to minimize rosette infection. The crop may be sprayed with a suitable insecticide for further control of rosette disease. Investigations on etiology of groundnut wilt should be initiated and appropriate control measures should be worked out. Disease surveys in other groundnut growings areas of Malawi should also be made in the 1983/84 crop season.

8.2. A visit to the Msekera Regional Research Station, Chipata, Zambia, February 23, 1983.

On this visit I was accompanied by Drs. D.V.R.Reddy and S.N.Nigam. We visited the National Oilseeds Development Project at the Msekera Regional Research Station located about 15 Km from Chipata, on the highway leading to Lusaka, on 23 February 1983. Dr. R.S.Sandhu, FAO Groundnut Breeder, coordinated our visit. After lunch with Dr.Sandhu, we met Mr. G.Miti, acting Officer-in-Charge of the station who briefed us on the various research activities of the station. We then drove to the farm and met Dr. G. Kelly, Agronomist, Mr.Musandya, Agronomist, Mrs. E. Nawali, Breeder, Mr.W.Luhanga, Breeder, Mr. Mayunda and Mr. Tembo, Technical Assistants. We visited various breeding, agronomy and pathology trials on the farm. Dr. Kelly explained his trials on effect of various dosages of phosphate (30,60,90 and 120 Kg/Ha) on yield of cultivars Makulu Red and Chalimbana, and on the effects of plant spacing on their yield and on rosette disease incidence. The station has got an effective seed production program. The recommended varieties are initially grown in prebasic seed plots under the supervision of scientists at the station and then supplied to 'ZAM seed' for further distribution to registered groundnut growers. Dr. Sandhu showed us some yield trials where he is testing a number of lines selected from ICRISAT breedilng material supplied to him. We also saw entries of the ICRISAT "International Groundnut Foliar Diseases Nursery - IGFDN". The trial was well laid out and

maintained. There was a good build up of early leafspot on susceptible check cultivars. The entries were not scored for disease resistance as the crop was not at a suitable stage for evaluation. We discussed various aspects of screening of germplasm and breeding lines for resistance to early leafspot and rosette.

Early leafspot and rosette were found to be serious on the farm. Late leafspot, rust, and pepper spot diseases were also observed but were not so serious. Peanut mottle virus disease was observed in almost all plots surveyed and the incidence ranged from 5 to 20%. Wilt (aetiology not known) was observed in some fields especially on border rows. Damage due to leaf hoppers was also observed in certain plots.

8.3. A visit to Zimbabwe, March 7-10, 1983.

Together with Dr. Nigam, I visited Zimbabwe in response to an invitation from Mr. G.L. Hildebrand, Groundnut Breeder in the University of Zimbabwe. This trip was extremely useful for developing contacts with scientists working on groundnut in Zimbabwe and for getting first hand information on breeding for resistance to Cercospora arachidicola, Phoma arachidicola and rosette virus diseases. Dr. Nigam has already produced a detailed trip report on our visit wherein he covered many aspects of groundnut cultivation in Zimbabwe and research on breeding for resistance to diseases. He also discussed possible areas of cooperation between ICRISAT Regional Program in Malawi and the Department of Research and Specialist Service under the Ministry of Agriculture, Zimbabwe. In this report, I am briefly presenting some of my observations on research activities on groundnut and possible areas for future cooperation especially on aspects of disease resistance.

We reached Harare on 7 March 1983 via Blantyre. Mr. A.Z.Chiteka, Groundnut Breeder, received us at the airport and briefed us on various research activities in groundnut breeding and in general organisation of research in Zimbabwe.

The Department of Research and Specialist Services of the Ministry of Agriculture is responsible for the agricltural research in the country. The Crop Breeding Institute situated in Harare Research Station is responsible for research in groundnut

breedilng. Mr. G.L.Hildebrand has been actively associated with groundnut breeding for a long time and has made an excellent contribution by developing high yielding groundnut varieties. He has now left the institute recently and joined the University of Harare as a Research Fellow. Mr. Chiteka has now taken his place in the Ministry. Mr. Chiteka has recently visited ICRISAT Centre, Hyderabad, India. Dr. D.L.Cole, Senior Lecturer, University of Zimbabwe, looks after research on groundnut diseases under a special arrangement with the Crop Breeding Institute.

Mr. Chiteka drove us around the farm at the Harare Research Station and we had a quick look at the facilities available on the farm. Fields are well maintained. Very good facilities, including sprinkler irrigation and rain shelters, are available at the station.

On the next day I visited the University of Zimbabwe. I had a very useful and lengthy discussion with Mr. Hildebrand and Dr. Cole on aspects of breeding for resistance to Cercospora arachidicola, Phoma arachidicola and rosette. I visited Dr. Cole's laboratory and had an opportunity to see cultures of P. arachidicola. Dr. Cole explained her collaborative research work with the Crop Breeding Institute on C. arachidicola and P. arachidicola. She has made excellent progress on control of these diseases using fungicides and on understanding the interactions of C. arachidicola and P. arachidicola. She has screened a large number of germplasm lines for resistance to these diseases and identified several good sources of resistance. She is currently

interested in understanding the mechanisms of resistance involved.

With Mr. Hildebrand, Dr. Cole, Mr. Chiteka and Dr.Nigam, I visited the Variety Testing Centre at Gwebi situated some 30 Km Northwest of Harare. We went around various breeding and pathology field trials. Fields were well maintained and has good facilities for irrigation. C. arachidicola and P. arachidicola were found to be predominant and destructive. Botrytis blight (Botrytis cinerea) was very serious on some germplasm lines. Late leafspot, rust and rosette were occasionally observed. PMV was also present on some local germplasm lines but not in serious proportions. Phoma blight is regarded as a serious problem on the early planted crop especially under irrigation. I had a very useful discussion with Dr. Cole on the epidemiology of Phoma blight in Zimbabwe. She also explained the methodology of screening of germplasm and breeding lines for resistance to P. arachidicola. We visited the ICRISAT "International Groundnut Foliar Diseases Nursery - IGFDN". This trial was planted late and the disease pressure was insufficient to permit meaningful evaluation of entries for resistance to C. arachidicola and P. arachidicola. We requested Mr. Chiteka to score the IGFDN entries for resistance if disease pressure become high enough as measured by build up on susceptible check cultivars.

In the afternoon, we returned to Harare Research Station and visited various field trials. Mr. Hildebrand briefed us his breeding material resistant to P. arachidicola and rosette. I was impressed by several of his breeding lines selected from crosses

between PI 274190 (resistant to P. arachidicola) and Egret (susceptible to P. arachidicola) (Fig. 10). Some of these promising breeding lines are being compared with local varieties with and without control of diseases using Bravo. These studies are very similar to our studies with rust and late leafspot resistant lines at ICRISAT Center, Hyderabad. Several sources of resistance to P. arachidicola are now available in Zimbabwe. Mr. Hildebrand has made a generous offer of this material for evaluation against rust and late leafspot at ICRISAT Center. We are grateful to him for the offer. It would be exceedingly interesting to evaluate these lines for resistance to the various diseases and pests we are currently investigating at ICRISAT.

On March 9, I visited a Communal area at Chihuri along with Dr.Nigam, Mr.Hildebrand, Mr. Chiteka, Dr. Cole, Miss. F.A. Chanakira, Research Fellow, University of Zimbabwe, and Mr. R.T. Chimbarawga, Research Officer, Agronomy Institute, Harare Research Station, to see a varietal trial which was planted by Mr. Chiteka in collaboration with personnel of the Department of Agriculture and Technical Services. The trial consisted of four varieties planted on two different dates with a gap of 4 weeks between plantings. Rosette was common on late planted trials. C. arachidicola was also observed but was not serious. On our way back, we visited the Henderson Research Station where Dr. Cole conducts trials on fungicidal control of C. arachidicola and P. arachidicola.

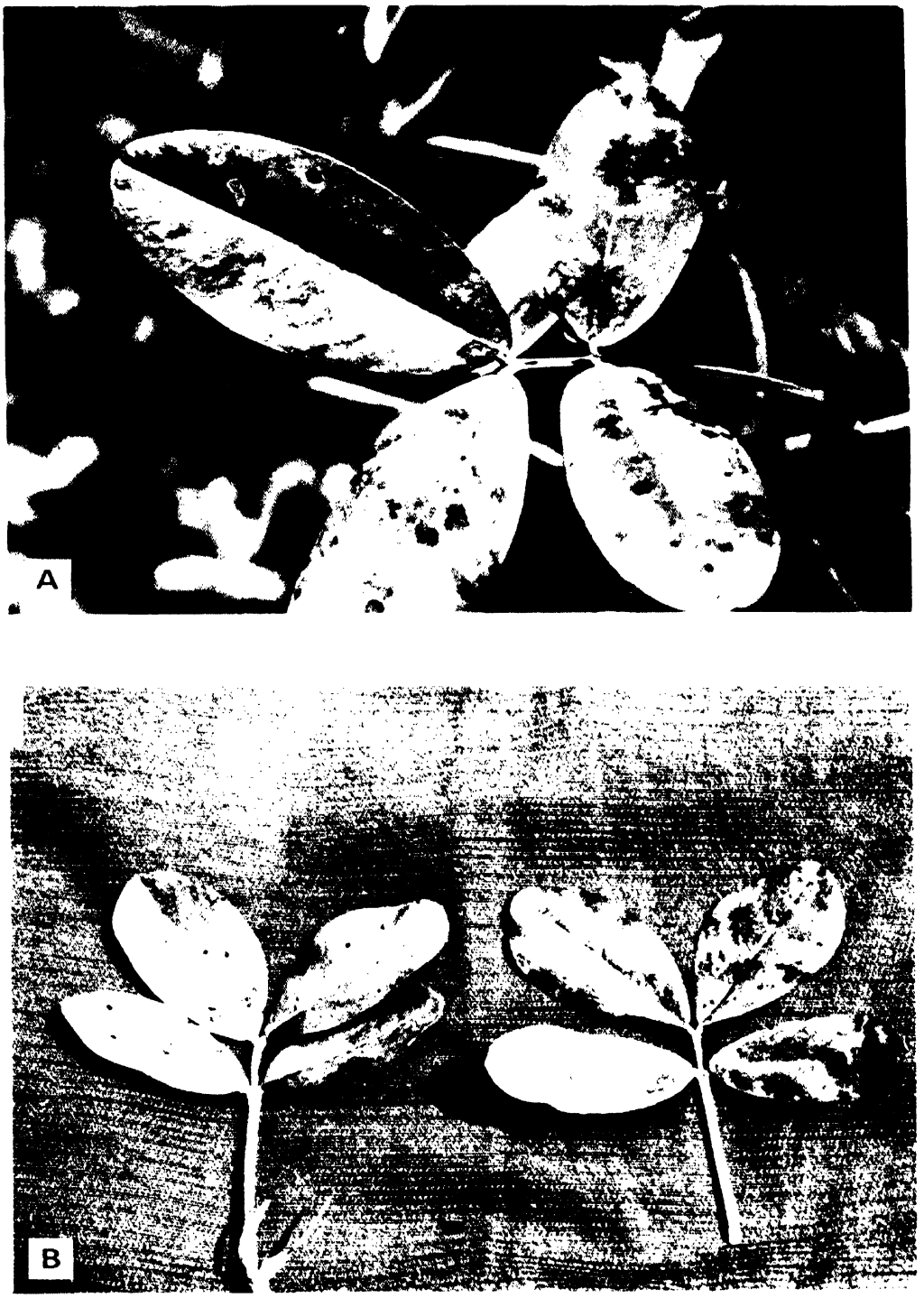


Fig. 10: A) Web blotch caused by *Phoma arachidicola*.

B) Reactions of genotypes to *P. arachidicola* in Zimbabwe: Left, resistant genotype PI 274190; Right susceptible genotype Egret.

We left Harare on March 10, 1983 and reached Lilongwe via Blantyre.

8.4. A trip to Ethiopia, 27 April to 1 May, 1983.

Dr. K.W.Riley, Technical Advisor for Oilcrops, Holetta Station, Institute of Agricultural Research, Ethiopia, during his visit to ICRISAT Regional Groundnut Program in Malawi along with Dr. Roger Kirkby, Program Officer (Crops and Cropping Systems), Regional Office for Eastern and Southern Africa, International Development Research Centre (IDRC), extended an invitation to me to visit Ethiopia. After getting the formal approval from ICRISAT Center, Hyderabad, I visited Ethiopia from 27 April to 1 May on my way back to India. The purpose of my trip was to participate in a group discussion on quarantine aspects of groundnut rust and to deliver a lecture on diseases of groundnut at the Institute of Agricultural Research, Addi Ababa.

I reached Addis Ababa on 27 April, 1983. Dr. Riley met me at the airport. We drove to Holetta Station situated some 45 Km west of Addis Ababa. Dr. Riley briefed me on the various research activities at the station and of objectives of the IDRC funded projects in Ethiopia.

Next day I visited the Institute of Agricultural Research, Addis Ababa, and called on Dr. Taye Worku, General Manager. He expressed his desire to have more cooperative research with ICRISAT. In the morning, I presented a seminar on diseases of groundnut with emphasis on breeding for resistance. The seminar was attended by IAR pathologists and others working on groundnut improvement at various agricultural research stations in

Ethiopia. After the seminar we had a very useful and lengthy discussion, especially on spread of groundnut rust through seed movement. A group discussion on quarantine aspects of groundnut rust was arranged in the afternoon and the discussion was continued for about 4 hours. Mr. Yebio Woldemarian, Project Leader, Low-Land Oilcrops, chaired the session. Groundnut rust has already been reported from Ethiopia. It is believed that rust is seed-borne and strict quarantine measures are observed in Ethiopia regarding import of seed material from other countries. It is interesting to note that the movement of seed from rust affected areas within the country is also restricted. Based on research done at ICRISAT, I emphasised that rust is not internally seed-borne. Urediniospores may be carried on the seed surface but disease should not be established if the seed is treated with a suitable fungicide. I tried to convince the participants from the quarantine unit that there was no danger of spread of groundnut rust through seed movement within the country.

I visited Low-Land Agricultural Research Station at Melkaworer situated some 200 Km southeast of Addis Ababa. Mr. Yebio Woldemarian coordinated this visit. I met Mr. Asfaw Tulu, Plant Pathologist (recently he visited ICRISAT), Mr. Adugna Wakijra, Agronomist, Miss Meaza, Technical Assistant (Plant Pathology) and Mr.Kidane-Marim Hagos, Technical Assistant (Groundnut) and we went around trials. Mr. Yebio has made several promising selections from a breeding population supplied by ICRISAT Center. The material was planted in progeny rows. He

told me that the selections will be multiplied for inclusion in multilocational testing. The crop was at maturity. Leafspots were observed on the crop especially on the lower leaves but defoliation was negligible. Diseases are not considered to be important in off season trials. I was told by Mr. Tulu that early leaf spot and rust are serious during the monsoon season. Farm facilities are excellent but laboratories at the station are poorely equipped.

I left Addis Ababa on 1 May 1983 and reached Hyderabad on 2 May 1983 via Bombay.

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I thank Mr.G.L.Hildebrand, Mr,A.Z.Chiteka, and Dr.D.L.Cole for sparing their valuable time and for discussions during my visit to Zimbabwe.

I thank Dr.R.S.Sandhu for inviting me to visit the National Oilseeds Development Project at Msekera Regional Research Station, Chipata, Zambia and for his hospitality during my visit.

I thank Dr.K.W.Riley for inviting me to visit Ethiopia and for sparing his valuable time during my visit. I wish to express my sincere gratitude to Mr.Yebio Woldemarian for making my visit a pleasant one. My special thanks are due to Mrs.Katyayani Riley for her hospitality.

10. REFERENCES:

1. ANON. (1982). Chitedze Agricultural Research Station, 1981/82 Station Guide. Department of Agricultural Research, Ministry of Agriculture, Lilongwe, Malawi.

2. CHIYEMBEKEZA, A.J. (1982). Groundnut improvement programme in Malawi. Paper prepared for presentation to Degree 5 students of Bunda College of Agriculture, March, 1962.

3. CORBETT, D.C.M. (1963). Handbook of plant diseases in Nyasaland, Government Printer, Zomba, Nyasaland (Malawi).

4. GIBBONS, R.W. and MERCER, P.C. (1972). Peanut disease control in Malawi, Central Africa. Journal of American Peanut Research and Education Association Inc., 4: 58-66.

5. HULL, R. and ADAMS, A.N. (1968). Groundnut rosette and its assistor virus. Annals of Applied Biology 62: 139-145.

6. JACKSON, C.R. and BELL, D.K. (1969). Diseases of peanut (groundnut) caused by fungi. University of Georgia, College of Agriculture Experiment Stations, Research Bulletin 56.

7. JENKINS, W.A. (1938). Two fungi causing leafspots of peanut. Journal of Agriculture Research, 56: 317-332.

8. MERCER, P.C. (1974). Fungicidal control of leafspots of

groundnut in Malawi. Oleagineux 29: 247-252.

9. MERCER, P.C. (1977). Pests and diseases of groundnut in Malawi. I. Virus and foliar diseases. Oleagineux 32: 483-488.

10. MERCER, P.C. (1978 a). Pests and diseases of groundnuts in Malawi. II. Discorders of pods, kernels and seedlings. Oleagineux 33: 119-122.

11. MERCER, P.C. (1978 b). Pests and diseases of groundnuts in Malawi. III. Wilts, post-harvest, physiological and minor disorders. Oleagineux 33: 619-624.

12. MUGHOGHO, L.K. (1968). Annual Report of the Agricultural Research Council of Malawi.

13. MUGHOGHO, L.K. (1969). Annual Report of the Agricultural Research Council of Malawi.

14. MUGHOGHO, L.K. (1969). List of diseses of grain legume crops in Malawi, Mimiograph.

15. PEREGRINE, W.T.H. and SIDDIQI, M.A. (1972). A revised and annotated list of plant diseases in Malawi. Phytopathological Papers, NMo.16.

16. SIBALE, P.K. and KISYOMBE, C.T. (1980). Groundnut production, utilization, research problems and further research

needs in Malawi. ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 1980. Proceedings of the International workshop on Groundnuts, 13-17 October, 1980, Patancheru, A.P., India, pp. 249.253.

17. WIEHE, P.O. (1953). The plant diseaes of Nyasaland. Mycological Papers, No.53.

APPENDIX I

SCREENING OF GROUNDNUT GERMPLASM FOR RESISTANCE TO *CERCOSPORA ARACHIDICOLA* AT THE CHITEDZE AGRICULTURAL RESEARCH STATION, LILONGWE, MALAWI -1982/83.

Line No.	ICG No.	Genotype	USDA No.	Origin	Reaction to *C.arachidicola*	
					Defoliation (%)	Disease score
1	262	NC Ac 50	PI 240543	Argentina	95	9
2	263	NC Ac 51	PI 240546	Argentina	100	9
3	270	NC Ac 466	PI 149641	Brazil	95	9
4	271	NC Ac 470	PI 118474	Brazil	100	9
5	272	NC Ac 471	PI 152144	Argentina	100	9
6	273	NC Ac 489	PI 121520	Argentina	100	9
7	274	NC Ac 490	PI 118480	Brazil	100	9
8	276	Nc Ac 503	PI 153158	Argentina	100	9
9	277	NC Ac 513	PI 119081	Brazil	100	9
10	270	NC Ac 515	PI 119204	Argentina	100	9
11	281	NC Ac 519	PI 118995	Brazil	100	9
12	283	NC Ac 524	PI 153159	Argentina	100	9
13	288	NC Ac 540	PI 118996	Brazil	100	9
14	289	NC Ac 541	PI 152125	Brazil	95	9
15	290	NC Ac 542	PI 152108	Brazil	95	9
16	292	NC Ac 549	PI 119076	Brazil	95	9
17	300	NC Ac 580	PI 152119	Brazil	100	9
18	302	NC Ac 586	PI 118200	Brazil	100	9
19	305	NC Ac 592	PI 153169	Argentina	100	9
20	306	NC Ac 596	PI 152139	Brazil	100	9

21	307	NC Ac 599	PI 152141	Brazil	100	9
22	309	NC Ac 605	PI 119063	Brazil	100	9
23	314	NC Ac 645	PI 118471	Brazil	100	9
24	317	NC Ac 690	PI 121521	Argentina	100	9
25	318	NC Ac 700	PI 119082	Brazil	100	9
26	320	NC Ac 706	PI 117850	Brazil	100	9
27	322	NC Ac 710	PI 149636	Brazil	100	9
28	324	NC Ac 714	PI 119075	Brazil	100	9
29	326	NC Ac 721	PI 119065	Brazil	100	9
30	331	NC Ac 738	PI 117846	Brazil	90	9
31	332	NC Ac 741	PI 118989	Brazil	95	9
32	354	NC AC 854	PI 149643	Brazil	100	9
33	355	NC Ac 864	PI 152135	Brazil	100	9
34	361	NC Ac 923	PI 162813	Argentina	100	9
35	365	NC Ac 940	PI 161867	Argentina	100	9
36	366	NC Ac 945	PI 161297	Argentina	100	9
37	367	NC Ac 949	PI 161303	Argentina	100	9
38	369	NC Ac 956	PI 161312	Argentina	100	9
39	370	NC Ac 957	PI 161315	Argentina	100	9
40	371	NC Ac 958	PI 161316	Argentina	100	9
41	372	NC Ac 962	PI 162403	Bolivia	100	9
42	373	NC Ac 965	PI 162407	Bolivia	100	9
43	375	NC Ac 967	PI 162521	Argentina	100	9
44	376	NC Ac 975	PI 162529	Argentina	100	9
45	379	NC Ac 1001	PI 163347	Brazil	100	9
46	385	NC Ac 1270	PI 240542	Argentina	100	9
47	408	NC Ac 2689	PI 118480	Brazil	90	9
48	409	NC Ac 2696	PI 152132	Brazil	100	9

49	411	NC Ac 2700	PI 118996	Brazil	100	9
50	412	NC Ac 2709	PI 119240	Brazil	100	9
51	413	NC Ac 2717	PI 152141	Brazil	100	9
52	417	NC Ac 2723	PI 119078	Brazil	100	9
53	419	NC Ac 2733	PI 135489	Uruguay	100	9
54	423	NC Ac 2741	PI 118989	Brazil	100	9
55	424	NC Ac 2742	PI 153167	Argentina	100	9
56	427	NC Ac 2795	PI 153156	Argentina	100	9
57	429	NC Ac 2818	PI 153158	Argentina	100	9
58	431	NC Ac 2849	PI 152108	Brazil	100	9
59	433	NC Ac 2851	PI 152104	Brazil	100	9
60	440	NC Ac 2888	PI 152139	Brazil	100	9
61	441	NC Ac 2894	PI 119063	Brazil	100	9
62	448	NC Ac 2911	PI 119074	Brazil	100	9
63	450	NC Ac 2923	PI 153170	Argentina	100	9
64	454	NC Ac 2940	PI 153171	Argentina	100	9
65	465	NC Ac 17115	PI 275743	Brazil	100	9
66	466	NC Ac 17118	PI 275697	Brazil	100	9
67	468	NC Ac 17120	PI 275702	Brazil	100	9
68	469	NC Ac 17121	PI 275708	Brazil	100	9
69	472	NC Ac 17143	-	Brazil	100	9
70	475	NC Ac 17149	-	Brazil	100	9
71	1154	Ah.22	-	Mozambique	100	9
72	1189	Ah.811	-	Argentina	100	9
73	1192	Ah.812	-	Argentina	100	9
74	1257	Ah.7150	PI 10496	Argentina	100	9
75	1261	Ah.7172	PI 12155	Argentina	100	9
76	1311	Ec 99216	-	Argentina	100	9

77	1312	Ec 99671	PI 246388	S.Africa	100	9
78	1370	U-1-2-3	-	S.Africa	90	9
79	1371	U-1-2-4	-	Brazil,ex. S.Africa	95	9
80	1372	U-1-2-6	-	S.Africa	95	9
81	1412	U-2-24-1	-	Brazil	90	9
82	1426	U-4-4-8	-	S.Africa	100	9
83	1452	U-4-12-3	-	Argentina	100	9
84	1525	Manfredi 97	-	Argentina	100	9
85	1527	Manfredi 118	-	Argentina	100	9
86	1611	NC Ac 394	PI 119203	Argentina	100	9
87	1618	NC Ac 446	PI 119238	Brazil	100	9
88	1619	NC Ac 465	PI 153156	Argentina	100	9
89	1658	NC Ac 2659	PI 119053	Brazil	100	9
90	1660	NC Ac 2666	PI 118472	Brazil	100	9
91	1661	NC Ac 2672	PI 119238	Brazil	100	9
92	1678	NC Ac 2828	PI 119204	Argentina	100	9
93	1682	NC Ac 2845	PI 121519	Argentina	100	9
94	1699	NC Ac 17113	PI 275733	Brazil	100	9
95	1712	NC Ac 17142	-	Brazil	90	9
96	1746	Ah.810	-	Argentina	100	9
97	1785	EC 24374	PI 161296	Argentina	100	9
98	1804	EC 24395	PI 243689	Bolivia	100	9
99	1805	EC 161296	-	Argentina	100	9
100	1815	-	-	S.Africa	100	9
101	1816	EC 21107	-	-	100	9
102	1830	EC 24375	PI 161297	Argentina	100	9
103	1847	EC 38604	-	Argentina	100	9

104	1854	EC 24402	PI 161308	Argentina	100	9
105	1924	-	PI 262087	Brazil	85	9
106	1933	-	PI 161297	Argentina	100	9
107	1944	-	PI 226249	S.Africa	100	9
108	1988	EC 21164	-	Brazil	100	9
109	1998	Ah.22	-	Mozambique	100	9
110	2012	Ah.811	-	Argentina	100	9
111	2092	C.55437	-	Argentina	100	9
112	2116	Batani 9	-	India	100	9
113	2140	U/1/2/3	-	-	100	9
114	2173	Ah.54	-	Argentina	100	9
115	2192	Ah.7173	PI 12156	Brazil	100	9
116	2238	Barbaton	-	S.Africa	100	9
117	3040	Manfredi 108	-	Argentina	100	9
118	3041	Manfredi 112	-	Argentina	100	9
119	3079	Ah.2-21-14-1-14	-	India	100	9
120	3114	Ah.7166	PI 12030	S.Africa	100	9
121	3156	Brengold	-	S.Africa	100	9
122	3157	C.55-437	-	Argentina	100	9
123	3260	EC 21111	-	S.Africa	100	9
124	3269	EC 21124	-	-	100	9
125	3294	EC 21164	-	Brazil	100	9
126	3304	EC 24374	PI 161296	Argentina	100	9
127	3305	EC 24375	PI 161297	Argentina	100	9
128	3308	EC 24402	PI 161308	Argentina	100	9
129	3309	EC 24405	PI 226249	S.Africa	100	9
130	3312	EC 24422	PI 210827	Argentina	100	9
131	3324	EC 38604	-	Argentina	90	9

132	3325	EC 38606	Argentina	100	9
133	3326	EC 38607	Argentina	100	9
134	3362	Improved Spanish B2	Brazil	100	9
135	3397	Local Alarge	Brazil	100	9
136	3401	Man	Argentina	100	9
137	3402	Mani blanco	Argentina	100	9
138	3403	Manfredi-1	Argentina	100	9
139	3404	Manfredi-84	Argentina	100	9
140	3407	Manfredi-107	Argentina	100	9
141	3408	Manfredi-118	Argentina	100	9
142	3409	Manfredi Chanpaque	Argentina	100	9
143	3410	Mankoi	Argentina	100	9
144	3411	MF 2	Argentina	100	9
145	3487	Tatu 386	Brazil	100	9
146	3488	Tatu-1	Brazil	100	9
147	3587	55-437	Argentina	100	9
148	3589	57G-37A	S.Africa	100	9
149	3618	Valancia type	S.Africa	100	9
150	3626	EC 21157	Argentina	100	9
151	3633	EC 42552	Argentina	100	9
152	3641	EC 21147	Argentina	100	9
153	3657	EC 109271	Argentina	100	9
154	3663	EC 76450	Brazil	100	9
155	3670	EC 76442	Brazil	100	9
156	3704	EC 21024	Argentina	100	9
157	3757	EC 21164	Brazil	100	9

158	3769	Natal Common	-	S.Africa	100	9
159	4074	Ah.7462	-	S.Africa	100	9
160	4090	Ah.7758	-	Zimbabwe	100	9
161	4103	AH.7808	-	Zimbabwe	100	9
162	4560	Barbeton	-	S.Africa	100	9
163	4621	-	-	Brazil	100	9
164	4673	U/4/4-8	-	S.Africa	100	9
165	4825	Ah.7151	-	Argentina	100	9
166	4862	Ah.7684	-	Argentina	100	9
167	4886	Ah.6739	-	Argentina	100	9
168	4890	Ah.7081	-	Argentina	100	9
169	4893	Ah.7763	-	Argentina	100	9
170	4909	Ah.7747	-	Argentina	100	9
171	4949	Ah.1719	-	USA	100	9
172	4986	NC Ac 15996	PI 261919	Argentina	100	9
173	5064	NC Ac 2997	PI 119238	Brazil	100	9
174	5065	NC Ac 9532	PI 268616	Zimbabwe	100	9
175	5074	NC Ac 10110	PI 268548	Zimbabwe	100	9
176	5093	NC Ac 16126	PI 262076	Zimbabwe	100	9
177	5094	NC Ac 16129	PI 262079	Zimbabwe	80	9
178	5098	NC Ac 16808	PI 270792	Zimbabwe	80	9
179	5099	NC Ac 16819	PI 270803	Zimbabwe	100	9
180	5102	NC Ac 17059	PI 275719	Brazil	100	9
181	5103	NC Ac 17074	PI 275734	Brazil	100	9
182	5104	NC Ac 17086	PI 275747	Brazil	100	9
183	5113	NC Ac 17523	-	Brazil	85	9
184	5156	NC Ac 17035	PI 274267	Zimbabwe	100	9
185	5157	NC Ac 17038	PI 275691	Brazil	100	9

186	5159	NC Ac 17082	PI 275742	Brazil	90	9
187	5161	NC Ac 17510	-	Brazil	100	9
188	5213	EC 24392	PI 262075	Brazil	85	9
189	5216	EC 24396	PI 262087	Brazil	80	-
190	5218	EC 24398	PI 262081	Brazil	100	9
191	5462	Ah.1719	-	-	100	9
192	5580	Ah.7747	-	-	100	9
193	5706	NC Ac 15945	PI 331280	Argentina	100	9
194	5964	NC Ac 10115	PI 268553	Zibabwe	100	9
195	5968	NC Ac 16861	PI 270846	Zimbabwe	100	9
196	5992	NC Ac 9570	PI 268654	Zimbabwe	100	9
197	6012	NC Ac 16142	PI 262093	Bolivia	85	9
198	6021	NC Ac 434	PI 121063	Argentina	100	9
199	6026	NC Ac 3013	PI 240569	Argentina	100	9
200	6028	NC Ac 9572	PI 268655	Zimbabwe	100	9
201	6029	NC Ac 9586	PI 268670	Zimbabwe	100	9
202	6037	NC Ac 16792	PI 270775	Zimbabwe	100	9
203	6038	NC Ac 16805	PI 270789	Zimbabwe	100	9
204	6039	NC Ac 16831	PI 270815	Zimbabwe	100	9
205	6040	NC Ac 16833	PI 270817	Zimbabwe	100	9
206	6058	NC Ac 16790	PI 270773	Zimbabwe	100	9
207	6101	NC Ac 898	PI 161594	Argentina	100	9
208	6103	NC Ac 974	PI 162528	Argentina	100	9
209	6151	NC Ac 2617	PI 269702	Argentina	100	9
210	6162	NC Ac 3013	PI 240569	Argentina	100	9
211	6164	NC Ac 9287	PI 269927	Argentina	100	9
212	6166	NC Ac 9515	PI 268599	Zimbabwe	100	9
213	6175	NC Ac 9601	PI 268685	Zimbabwe	100	9

214	6177	NC Ac 9629	PI 268713	Zimbabwe	100	9
215	6178	NC Ac 9631	PI 268715	Zimbabwe	100	9
216	6202	NC Ac 10080	PI 268518	Argentina	100	9
217	6208	NC Ac 15995B	PI 261918	Argentina	100	9
218	6230	NC Ac 16141	PI 262092	Bolivia	100	9
219	6231	NC Ac 16158	PI 262110	Bolivia	85	9
220	6232	NC Ac 16159	PI 262112	Bolivia	80	9
221	6432	S/A7 Zonde	-	S.Africa	100	9
222	6490	KCA S/A6	-	S.Africa	100	9
223	6493	Argentine White	-	Argentina	100	9
224	6616	NC Ac 16149	PI 262100	Bolivia	100	9
225	6661	NC Ac 969	PI 162523	Argentina	85	9
226	6663	NC Ac 1209	PI 210825	Argentina	100	9
227	6664	NC Ac 1272	PI 240545	Argentina	100	9
228	6694	NC Ac 15979	PI 261895	Bolivia	100	9
229	6695	NC Ac 15998	PI 261921	Bolivia	100	9
230	6725	NC Ac 16995	PI 271105	Argentina	100	9
231	6783	NC Ac 16854	PI 270839	Argentina	100	9
232	6823	NC Ac 968	PI 162522	Argentina	100	9
233	6878	NC Ac 16863	PI 270848	Argentina	100	9
234	7297	-	PI 268572	Argentina	100	9
235	7316	NC Ac 15999	PI 261922	Argentina	100	9
236	7356	82/66	PI 261918	Argentina	100	9
237	7497	308/63	-	Argentina	100	9
238	7501	144/6	PI 262110	Bolivia	100	9
239	7614	NC Ac 981	PI 162535	Argentina	100	9
240	7734	NC Ac 9441	PI 262104	Bolivia	100	9
241	7757	Jacana	-	Zimbabwe	100	9

242	7792	NC Ac 17042	PI 275695	Brazil	100	9
243	7811	NC Ac 17054	PI 275714	Brazil	100	9
244	7812	NC AC 16116	PI 262066	Brazil	100	9
245	7936	NC Ac 16955	PI 270955	Zimbabwe	100	9
246	7969	NC Ac 9565	PI 268649	Zimbabwe	100	9
247	7975	NC Ac 10095	PI 268533	Zimbabwe	100	9
248	8000	NC Ac 10054	PI 268492	Zimbabwe	100	9
249	8002	NC Ac 10076	PI 268514	Zimbabwe	100	9
250	8004	NC Ac 10119	PI 268557	Zimbabwe	100	9
251	8013	NC Ac 16966	PI 270968	Zimbabwe	100	9
252	8035	NC Ac 9593	PI 268677	Zimbabwe	100	9
253	8046	NC Ac 10083	PI 268521	Zimbabwe	100	9
254	8049	NC Ac 16453	PI 268781	Zimbabwe	100	9
255	8052	NC Ac 16891	PI 270879	Zimbabwe	100	9
256	8089	NC Ac 16509	PI 268841	Zimbabwe	100	9
257	8242	NC Ac 15886	-	Argentina	100	9
258	8257	NC Ac 17099	-	Brazil	100	9
259	8259	NC Ac 17151	-	Brazil	100	9
260	8262	NC Ac 17154	-	Brazil	100	9
261	8448	RG-21	-	S.Africa	100	9
262	8449	RG-22	-	Zimbabwe	100	9
263	8450	RG-23	-	Zimbabwe	100	9
264	8452	RG-26	-	Zimbabwe	100	9
265	8456	RG-54	-	S.Africa	100	9
266	8458	RG-56	-	S.Africa	100	9
267	8459	RG-58	-	S.Africa	100	9
268	8460	RG-59	-	Zimbabwe	100	9
269	8467	RG-79	-	Zimbabwe	100	9

270	8468	RG-80	Zimbabwe	100	9
271	8469	RG-81	Zimbabwe	100	9
272	8475	RG-93	Brazil	100	9
273	8481	RG-106	Brazil	85	9
274	8482	RG-107	Brazil	100	9
275	8483	RG-110	Zimbabwe	100	9
276	8488	RG-139	S.Africa	100	9
277	8492	RG-163	S.Africa	100	9
278	8508	RG-309	S.Africa	100	9
279	8509	RG-311	S.Africa	100	9
280	8514	RG-319	S.Africa	100	9
281	8515	RG-326	Bolivia	80	9
282	8517	RG-328	Bolivia	80	9
283	8519	RG-330	Brazil	80	9
284	8521	RG-332	Brazil	80	9
285	8522	RG-333	Brazil	80	9
286	8523	RG-334	Brazil	80	9
287	8524	RG-336	Brazil	100	9
288	8525	RG-339	Brazil	100	9
289	8526	RG-340	Brazil	100	9
290	8527	RG-343	Brazil	100	9
291	8528	RG-347	Brazil	85	-
292	8529	RG-348	Brazil	80	-
293	8533	RG-354	Zimbabwe	100	9
294	8534	RG-355	Zimbabwe	100	9
295	8550	RG-391	Malagasay	100	9
296	8551	RG-392	Malagasay	100	9
297	8552	RG-393	Malagasay	100	9

298	8555	NC Ac 53	PI 240560	Argentina	100	9
299	8560	NC AC 404	PI 121498	Argentina	100	9
300	8569	NC Ac 868	PI 119072	Brazil	100	9
301	8570	NC Ac 951	PI 161305	Argentina	100	9
302	8744	47-3	-	Malagasay	100	9
303	8749	57-94	-	S.Africa	85	9
304	8779	ZM 434	-	Zambia	100	9
305	8796	ZM 605	-	Zambia	100	9
306	9140	58-573	-	S.Africa	100	9
307	9147	58=596	-	Zimbabwe	100	9
308	9153	58-617	-	Argentina	100	9
309	9154	58-618	-	Argentina	100	9
310	9159	58-644	-	Brazil	100	9
311	9165	58-668	-	S.Africa	100	9
312	9192	75-32	-	S.Africa	100	9
313	9227	58-470	-	Malagasay	100	9
314	9229	98-472	-	Malagasay	100	9
315	9233	58-489	-	Argentina	100	9
316	9347	59-411	-	Malagasay	100	9
317	9348	59-413	-	Argentina	100	9
318	9356	59-431	-	Brazil	100	9
319	9357	59-437	-	Brazil	100	9
320	9360	59-444	-	Brazil	100	9
321	9364	59-451	-	Malagasay	100	9
322	9372	59-476	-	Brazil	100	9
323	9373	59-479	-	S.Africa	100	9
324	9374	59-480	-	S.Africa	100	9
325	9377	59-485	-	Malagasay	100	9

326	9385	Porto Alegre	-	Brazil	100	9
327	9400	61-28	-	Brazil	100	9
328	9401	61-29	-	Argentina	100	9
329	9406	61-39	-	Argentina	100	9
330	9420	61-122	-	S.Africa	100	9
331	9443	75-49	-	Argentina	100	9
332	9445	75-51	-	Argentina	100	9
333	483	Florish Runner	-	USA	100	9
334	503	Ah 22	-	Mozambique	100	9
335	1586	Ah 23	-	-	100	9
336	2384	NC Ac 17139	PI 313949	Bolivia	100	9
337	2671	EC 20972	-	Brazil	100	9
338	2678	EC 20981	-	Brazil	100	9
339	2790	MF 46-S-43	-	Argentina	85	9
340	3039	Manfredi 68	-	Argentina	85	9
341	3828	EC 20961	-	Brazil	90	9
342	3833	EC 20968	-	S.Africa	90	9
343	3876	AUT	-	S.Africa	100	9
344	4089	Ah 7753	-	Zimbabwe	90	9
345	4198	Ah 7243	-	Brazil	90	9
346	4199	Ah 7244	-	Zimbabwe	90	9
347	4430	Blanco white	-	Brazil	90	9
348	4490	S7-1-12	-	S.Africa	95	9
349	4494	S7-1-17	-	S.Africa	90	9
350	4496	S7-1-19	-	S.Africa	95	9
351	4810	EC 21013	-	Brazil	90	9
352	4989	NC Ac 16958	PI 270959	Zimbabwe	90	9
353	5623	Ah 1718	-	Mozambique	90	9

354	5713	NC.Ac 17110	PI 268839	Zimbabwe	95	9
355	5967	NC Ac 16559	PI 268898	Zimbabwe	85	9
356	6031	NC Ac 9882	PI 268965	Zimbabwe	85	9
357	6149	NC Ac 2604	PI 269685	Zimbabwe	85	9
358	6161	NC Ac 3003	PI 240549	Argentina	90	9
359	6183	NC Ac 9918	PI 269001	Zimbabwe	95	9
360	6184	NC AC 9921	PI 269004	Zimbabwe	95	9
361	6207	NC Ac 15986	PI 261906	Bolivia	85	9
362	6285	NC Ac 17502	-	Bolivia	85	9
363	6433	Skylux A	-	S.Africa	100	9
364	7761	Barbaton	-	S.Africa	100	9
365	7925	NC Ac 10063	PI 268501	Zimbabwe	100	9
366	6190	NC Ac 9965	PI 269048	Zimbabwe	100	9
367	7998	NC Ac 10003	PI 269086	Zimbabwe	100	9
368	8008	NC Ac 16888	PI 270875	Zimbabwe	100	9
369	8010	NC Ac 16914	PI 270904	Zimbabwe	100	9
370	8014	NC Ac 16975	PI 270980	Zimbabwe	100	9
371	8076	NC Ac 16937	PI 270931	Zimbabwe	100	9
372	8077	NC Ac 16964	PI 270965	Zimbabwe	100	9
373	8109	NC Ac 17011	PI 274177	Bolivia	100	9
374	8261	NC Ac 17153	-	Brazil	100	9
375	8736	57-13	-	Brazil	100	9
376	8771	ZM -275	-	Zambia	100	9
377	8775	ZM -314	-	Zambia	100	9
378	8776	ZM -318	-	Zambia	100	9
379	8789	ZM -494	-	Zambia	100	9
380	8898	PI 339970	-	Bolivia	100	9
381	9098	58-619	-	Argentina	100	9

382	9199	57-438	-	Brazil	100	9
383	784	Mosambique	-	Mozambique	100	9
384	961	RS-1	-	-	100	9
385	991	Ah 15	-	S.Africa	100	9
386	2363	NC Ac 2857	PI 153326	S.Africa	100	9
387	2385	NC Ac 17140	PI 313950	Bolivia	100	9
388	2700	EC 21025	-	Brazil	100	9
389	2796	MPI-1	-	Malawi	100	9
390	2837	Spanish Peanut	-	Argentina	100	9
391	3436	PI 246388	-	S.Africa	100	9
392	4154	Ah 6998	-	Brazil	100	9
393	4174	Ah 6700	-	Brazil	100	9
394	4372	R7-24-2	-	Brazil	100	9
395	4397	SA Jumbo	-	S.Africa	100	9
396	4990	NC Ac 10067	PI 268505	Zimbabwe	100	9
397	5070	NC Ac 9987	PI 269070	Zimbabwe	100	9
398	5163	NC Ac 17530	-	Brazil	100	9
399	6150	NC Ac 2613	PI 269698	Argentina	90	9
400	6155	NC Ac 2866	PI 153330	S.Africa	90	9
401	6179	NC Ac 9888	PI 268971	Zimbabwe	85	9
402	6182	NC Ac 9917	PI 269000	Zimbabwe	85	9
403	6186	NC Ac 9923	PI 269006	Zimbabwe	100	9
404	6191	NC Ac 9966	PI 269049	Zimbabwe	100	9
405	6194	NC Ac 10015	PI 269098	Zimbabwe	100	9
406	6197	NC Ac 10039	PI 269122	Zimbabwe	100	9
407	8749	57-94	-	S.Africa	100	9
408	8760	ZM-25	-	Zambia	100	9
409	8762	ZM-55	-	Zambia	100	9

410	8769	ZM-209	-	Zambia	100	9
411	8770	ZM-231	-	Zambia	100	9
412	8773	ZM-295	-	Zambia	100	9
413	8780	ZM-435	-	Zambia	100	9
414	8781	ZM-436	-	Zambia	100	9
415	8782	ZM-437	-	Zambia	100	9
416	8784	ZM-440	-	Zambia	100	9
417	8787	ZM-461	-	Zambia	75	9
418	8793	ZM-560	-	Zambia	85	9
419	8794	ZM-563	-	Zambia	85	9
420	8811	ZM-866	-	Zambia	100	9
421	8812	ZM-869	-	Zambia	100	9
422	8814	ZM-877	-	Zambia	100	9
423	8817	ZM-881	-	Zambia	100	9
424	8818	ZM-883	-	Zambia	100	9
425	8824	ZM-988	-	Zambia	100	9
426	33	RS 114	-	-	100	9
427	106	99-5	-	-	100	9
428	209	Ah 6279	-	-	100	9
429	221	TMV 2	-	India	100	9
430	233	TG 3	-	India	100	9
431	235	NG 268	-	India	100	9
432	261	NC Ac 44	PI 161297	Argentina	100	9
433	286	NC Ac 529	PI 124681	Costa Rica	100	9
434	287	NC Ac 537	PI 121519	Argentina	100	9
435	391	NC Ac 1301	PI 240579	Ghana	100	9
436	428	NC Ac 2816	-	USA	100	9
437	453	NC Ac 2931	PI 152111	Brazil	100	9

438	552	C 501	-	India	85	9
439	641	53-68	-	Nigeria	90	9
440	669	2750	-	-	85	9
441	796	Punjab 648	-	India	85	9
442	820	C-18	-	-	100	9
443	891	C-148	-	-	100	9
444	940	EC 21135	-	-	100	9
445	950	G 37	-	-	100	9
446	966	R.S.7	-	-	100	9
447	1020	Ah. 2105	-	India	100	9
448	1044	4-16	-	-	100	9
449	1123	Natal Common	-	S.Africa	100	9
450	1136	Starr	-	USA	100	9
451	1156	Ah 32B	-	-	100	9
452	1175	Ah 65	-	-	100	9
453	1563	X9-2-B-25-B	-	India	100	9
454	1649	NC Ac 2190	-	USA	100	9
455	1670	NC Ac 2748	-	USA	100	9
456	1689	NC Ac 2884	PI 153169	Argentina	100	9
457	1702	NC Ac 17124	PI 275745	Peru	80	9
458	1745	Ah 32	-	India	100	9
459	1908	MH 2	-	India	100	9
460	2247	NC Ac 11	-	USA	100	9
461	2320	NC Ac 2462	-	USA	100	9
462	2475	Ah 6897	-	-	85	9
463	2574	C.148	-	-	85	9
464	2716	EC 76446(292)	-	Uganda	85	9
465	2899	39-2	-	Uganda	100	9

466	2962	Ah 8254	-	India	100	9
467	2965	OG 69-6-1	-	India	100	9
468	2969	OG 3-24	-	India	100	9
469	2975	TG 14	-	India	100	9
470	2976	TG 17	-	India	100	9
471	3077	Abuya	-	-	100	9
472	3429	No.276	-	-	100	9
473	3431	OG 1-5-3	-	India	100	9
474	3478	Spanhoma	-	USA	100	9
475	3530	USA 93	-	USA	100	9
476	3543	2-5	-	-	100	9
477	3772	No.276	-	India	100	9
478	3962	Sel.No.11	-	India	100	9
479	4118	91776	-	India	100	9
480	4462	GA.207-3-4	-	USA	100	9
481	4616	Manfredi-1	-	Argentina	100	9
482	422	-	PI 152112	Brazil	100	9
483	453	-	PI 152111	Brazil	100	9
484	2379	-	PI 261911	Bolivia	80	9
485	4999	-	PI 119081	Brazil	100	9
486	5089	-	PI 262032	Brazil	100	9
487	9299	48-435	-	S.America	100	9
488	9435	Preto-30	-	Brazil	100	9
489	-	Chalimbana	-	-	85	9
490	-	Mani Pintar	-	-	90	9
491	-	Egret	-	-	100	9
492	-	Spancross	-	-	100	9
493	-	RG 1	-	-	85	9

494	-	E 879/614		100	9
495	-	SAC 58		85	9
496	-	SP 1		85	9
497	-	RRI/6		85	9
498	1175	Ah-65	-	100	9
499	1004	Ah-114	India	95	9
500	2462	Ah-330	India	90	9
501	3150	Argentina	USA	100	9
502	-	CDM-1	-	85	9
503	3163	Chico	India	100	9
504	5252	Colarodo Manfredi	Argentina	100	9
505	3180	Dh-3-20	India	100	9
506	7875	Dh-3-29	India	100	9
507	4580	EC 76446(Sp.)	Uganda	100	9
508	2716	EC 76446(292)	Uganda	85	9
509	2963	FSB-7-2	India	100	9
510	-	FSB-7-5	-	100	9
511	950	G-37	-	90	9
512	751	Gangapuri	India	100	9
513	-	GAUG-1	-	100	9
514	3353	Gujarat Dwarf Mutant2	India	100	9
515	3046	Gujarat Narrow Leaf Mutant	India	85	

516	1326	J 11	-	India	100	9
517	6370	Jacana	-	Zimbabwe	100	9
518	957	JH-62	-	India	90	9
519	3369	JH-89	-	India	100	9
520	3370	JH-107	-	India	100	9
521	3375	JH-171	-	India	100	9
522	3376	JH-223	-	India	100	9
523	-	JH-335	-	-	90	9
524	7827	JL-24	-	India	100	9
525	3026	HG-1	-	India	100	9
526	1008	Kadiri 71-1	-	India	90	9
527	2773	Kanyoma	-	Tanzania	90	9
528	4790	Krap St.16	-	Argentina	90	9
529	4790	Krap St.4	-	Argentina	80	9
530	7824	L.No.95-A	-	India	90	9
531	3412	MGS-7	-	India	100	9
532	3413	MGS-8	-	India	100	9
533	3414	MGS-9	-	India	80	9
534	3042	MK-374	-	Nigeria	80	9
535	-	MH-1	-	-	100	9
536	5326	NC-17	-	USA	90	9
537	6446	NC 3033	-	USA	85	9
538	2248	NC Ac 12	-	USA	90	9
539	2268	NC Ac 316	-	USA	90	9
540	370	NC Ac 957	PI 161315	Argentina	100	9
541	2296	NC Ac 1107	-	USA	90	9
542	5040	NC Ac 2214	-	USA	90	9
543	5042	NC Ac 2232	-	USA	95	9

544	2342	NC Ac 2731	PI 138870	Iran	100	9
545	2405	NC Ac 2821	-	USA	90	9
546	1697	NC Ac 17090	-	Peru	100	9
547	1704	NC Ac 17129	-	Peru	85	9
548	1707	NC Ac 17132	-	Peru	85	9
549	7013	NC Ac 17133(RF)	-	India	85	9
550	1710	NC Ac 17135	-	Peru	85	9
551	1712	NC Ac 17142	-	Brazil	90	9
552	6049	NC Ac 17352	-	USA	80	9
553	6022	NC Ac 927	PI 162859	Sudan	80	9
554	7881	Smith 198	PI 215696	Peru	80	9
555	4747	Tarapoto	PI 259747	Peru	80	9
556	1703	NC Ac 17127	PI 275750	Peru	85	9
557	6330	MS-48	PI 270806	Zimbabwe	85	9
558	4746	Line 136	PI 298115	Israel	95	9
559	7882	DHT 200	PI 314817	Peru	100	9
560	4749	-	PI 337394F	Argentina	100	9
561	4750	Rosado	PI 337409	Argentina	100	9
562	7884	Tarapoto	PI 341879	Israel	85	9
563	6340	Tarapoto	PI 350680	Honduras	90	9
564	7885	Tarapoto	PI 381622	Honduras	90	9
565	7886	WC 1178	PI 390593	Peru	85	9
566	7888	Blanco	PI 393516	Peru	80	9
567	7889	Blanco	PI 393517	Peru	100	9
568	7890	Morado	PI 393526	Peru	85	9
569	7892	(Bunch Sort)	PI 393527-B	Peru	100	9
570	7893	Tingomaria	PI 393531	Peru	90	9
571	7894	Cosa Farmer	PI 393641	Peru	100	9

572	7895	Iqites grower	PI 393643	Peru	100		9
573	7896	Iqites MK	PI 393646	Peru	90		9
574	7897	Tarapoto	PI 405132	Venezuela	85		9
575	7898	Blakeslee-4	PI 407454	Ecuador	90		9
576	7899	Resistant Corto(Romero)	PI 414331	Honduras	90		9
577	7900	Resistant Largo(Romero)	PI 414332	Honduras	95		9
578	2960	Pol-2	-	India	100		9
579	6322	RMP-12	-	Upper Volta	90		9
580	6333	RMP-89	-	Upper Volta	90		9
581	6323	RMP-91	-	Upper Volta	90		9
582	799	Robut 33-1	-	India	100		9
583	4770	Shantung KU.No.203	-	China	100		9
584	3060	Sulamit	-	USA exIsrael	85	9	
585	2956	SM-5	-	India	100	9	
586	1136	Starr	-	USA	100	9	
587	615	TG-1	-	India	85		9
588	5342	TG-16	-	India	100		9
589	2976	TG-17	-	India	100		9
590	221	TMV 2	-	India	100		9
591	99	TMV 4	-	India	90		9
592	249	TMV 7	-	India	100		9
593	-	UF-31513-1	-	-	100		9
594	3542	2-2	-	-	100		9
595	3543	2-5	-	-	100		9
596	3580	C.No.45-23	-	India	85		9

597	641	53-68(France)	-	NGA	85	9
598	-	72-R	-	-	100	9
599	-	73-24	-	-	100	9
600	2958	148-7-4-3-12-B	-	India	100	9
601	4117	91176	-	India	100	9
602	2968	x9-2-B-25-B	-	India	100	9
603	2966	x14-4-3-8-B	-	India	100	9
604	2959	x14-4-B-19-B	-	India	100	9
605	-	x52-x-x-1-B	-	-	85	9
606	2734	F 334A-B-14	-	USA	90	9

APPENDIX II

SCREENING OF BREEDING LINES FOR RESISTENCE TO *CERCOSPORA ARACHIDICOLA* AT THE CHITEDZE AGRICULTURAL RESEARCH STATION, LILONGWE, MALAWI-1982/83.

	Test entry	Reaction to *C.arachidicola*	
		Defoliation (%)	Disease score
	RUST RESISTANT LINES -F3 GENERATION		
1.	(FESR 11-P8-B3-B2-B2B1 x Shulamith) F2-B3 (S)	85	9
2.	(NC Ac 1107 x DHT 200) F2-B7 (S)	90	9
3.	(RMP 91 x NC Ac 17133 (RF) F2-B1(R)	100	9
4.	(Shantung KU No. 203 x EC 76446 (292) F2 -B2-B1(S)-B1-B1 x NC Ac 17133 (RF)F2-B3(R)	75-100	9
5.	(Jacana x NC Ac 17133 (RF) F2-B2(R)	100	9
6.	(NC Ac 2190 x PI 259747)F2-P113-P2-B1-B2 (R) x NC Ac 17133(RF)F2-B1(R)	90	9
7.	(J 11 x DHT 200)F2-B1(R)	100	9
8.	(2-2 x PI 259747)F2-B1-B1(S)-B1-B1 x L.No.95-A) F2-B3 (R)	90-100	9
9.	(FESR 8-P12-B1-B2-B1-B1 x Chico) F2-B1 (R)	100	9
10.	(Faizpur 1-5 x DHT 200)F2-B3 (R)	100	9
11.	(Goldin 1 x NC Ac 17133(RF)F2-B3(R)	80-100	9
12.	(Manipinter x NC Ac 17133(RF)F2-B1	80-100	9
13.	(Florigiant x Chico)F2-B2-B1-B1 x NC Ac 1733(RF)F2-B1	100	9
14.	(FESR 9-P8-B1-B2-B1-B1 x Chico)F2-B1	100	9
15.	(JL 24 x NC Ac 1733(RF) F2-B2	100	9
16.	(MH 1 x PI 259747) F2-B1-B1-B1(R)-B2-B1 x L.No.95-A)F2-B4	100	
17.	(F334-A-B-14 x DHT 200)F2-B4(R)	100	9

18.	(Tifspan x DHT 200)F2-B3(R)	100	9
19.	(Robut 33-1 x NC Ac 17133(RF)F2-B2(S)	100	9
20	(Shulamith x Robut 33-1)F2-P1-B1-B1-B1-B1 x NC Ac 17133 (RF)F2-B1	80-100	9
21.	(Robut 33-1 x Comet)F2-B1-B1-B1-B1 x NC Ac 17133(RF)	75-100	9
22.	(Colorado Manfredi) x NC Ac 17133(RF)F2-B2	80-100	9
23.	(53-68 x Chico)F2E-B1-B1-B1-B1 x NC Ac 17133(RF)F2-B1	100	9
24.	(Manfredi x NC Ac 17133(RF)F2-B3(S)	100	9
25.	(Robut 33-1 x Ah 8254)F2-B1-B1-B1-B1 x NC Ac 17133(RF)F2-B3	85-100	9
26.	(Jacana x DHT 200)F2-B2	100	9
27.	(Colorado Manfredi x DHT 200)F2-B2(R)	100	9
28.	(NC Ac 2731 x PI 298115)F2-B3-B2-B1(S)-B1 x NC Ac 17133 (RF)F2-B5(S)	75-100	9
29.	(Manfredi x NC 3033)F2-B1	100	9
30.	(NC Ac 1107 x Robut 33-1)F2-B1-B1-B1-B1 x NC Ac 17133(RF)F2-B2(S)	100	9
31.	(FSB 7-5 x DHT 200)F2-B4	100	9

RUST RESISTANT LINES- F4 GENERATION

1.	(Manipintar x EC 76446(292))F2-B1-B1	100	9
2.	(Faizpur 1-5 x PI 407454)F2-B1-B1	100	9
3.	(Dh 3-20 x PI 405132)F2-B4-B2	85-100	9
4.	(J 11 x TG3)F2-B4-B2-B1 x NC Ac 17090)F2-P1-B1	100	9
5.	(PI 259747 x TMV 2)F2-B1-B1	75-100	9
6.	(Robut 33-1 x 87/4/7(2))F2-B1-B1	80-100	9
7.	(Mani Pintar x EC 76446(292))F2-B1-B1	100	9

8.	(EC 76446(292) x Robut 33-1)F2-B1-B1	100	9
9.	(PI 259747 x NC Ac 17090)F2-B1-B1	100	9
10.	(Mani Pintar x DHT 200)F2-B1-B1	80-100	9
11.	(Mani Pintar x DHT 200)F2-B2-B1	80-100	9
12.	(Shantung KU.NO.203 x 28-206)F2-B1-B1	100	9
13.	(NC Ac 17133 x TMV 2)F2-B1-B1	75-100	9
14.	(NC Ac 17133 x TMV 2)F2-B1-B1	50-75	-
15.	(JH 89 x PI 407454)F2-B1-B1	100	9
16.	(Faizpur 1-5 x PI 407454)F2-B1-B4	100	9
17.	(EC 76446(292) x Robut 33-1)F2-B1-B1	90	9
18.	(EC 76446(292) x Robut 33-1)F2-B1-B1	75-100	9
19.	(PI 259747 x TMV 2) F2-B2-B1	100	9
20.	(EC 76446(292) x 87/4/7/(2))F2-B1-B11	100	9
21.	(NC Ac 17133 x NC Ac 15989)F2-P1-B1	80-90	9
22.	(J 11 x TG 3)F2-B4-B1 x NC Ac 17090)F2-B1-B1	100	9
23.	(MGS 9 x 2-5)F2-B2-B1-B1 x NC 3033)F2-B1-B1	100	9
24.	(J 11 x TG 3)F2-B4-B2-B1 x NC Ac 17090)F2-B2-B3	100	9
25.	(Gangapuri x PI 407454) F2-B1-B1	100	9
26.	(EC 67446(292) x Robut 33-1)F2-B1-B1	100	9
27.	(Manfredi x PI 407454)F2-B1-B1	100	9
28.	(PI 259747 x Chalimbana)F2-B1-B1	100	9
29.	(Makulu Red x DHT 200)F2-B1-B1	80	9
30	(PI 259747 x TMV 2)F2-B2-B1	90	9
31.	(Dh 3-20 x PI 407454)F2-B1-B2	100	9
32.	(Mani Pintar x DHT 200)F2-B2-B1	100	9
33.	(Robut 33-1 x NC Ac 2321)F2-P2-B1-B1-B1 x PI 407454)F2-B2-B1	100	9
34.	(Mani Pintar x Robut 33-1)F2-B1-B1	100	9

35.	(Dh 3-20 x PI 405132)F2-B1-B1	100	9
36.	(Shantung KU.No.203 x Robut 33-1)F2-B1-B1	100	9
37.	(PI 259747 x Robut 33-1)F2-B1-B1	75-100	9
38.	(Goldin 1 x PI 407454)F2-B1-B1	75-100	9
39.	(Gangapuri x PI 405132)F2-B1-B1	100	9
40	(Ah 8189 x Manfredi)F2-P2-B1-B1-B1 x PI 407454)F2-B1-B1	100	9
41.	(PI 259747 x Robut 33-1)F2-B2-B2	85-100	9
42.	(Dh 3-20 x PI 407454)F2-B1-B1	100	9
43.	(Robut 33-1 x PI 259747)F2-B1-B1	100	9
44.	(Goldin 1 x PI 407454)F2-B1-B1	100	9
45.	(Ah 8189 x Manfredi)F2-P3-B1-B1-B1 x PI 405132)F2-B1-B1	85-100	9
46.	(Gangapuri x PI 405132)F2-B1-B1	100	9
47.	(PI 259747 x Robut 33-1)F2-B1-B1	70-100	9
48.	(Shulamith x NG 268)F2-P2-B1-B1 x PI 407454)F2-B1-B1	100	9
49.	(Robut 33-1 x 87/4/7(2))F2-B1-B1	90-100	9
50.	(JH 89 x PI 407454)F2-B3-B1	100	9
51.	(JH 89 x PI 407454)F2-B3-B1	90-100	9
52.	(J 11 x TG 3)F2-B4-B2-B1 x NC Ac 17090)F2-B2-B1	90-100	9
53.	(M 13 x DHT 200)F2-B1-B1	100	9
54.	(Robut 33-1 x NC Ac 2821)F2-P2-B1-B1 x PI 407454) F2-B2-B1-B2	100	9
55.	(Robut 33-1 x P1 298115)F2-B1-B1	100	9
56.	(X40-4-3-8-B x POL 2)F2-B1-B1-B1 x NC 3033) F2-B1-B1	100	

LATE LEAFSPOT RESISTANT LINES -F5 GENERATION

1.	(Dh 3-20 x PI 405132)F2-B4-B1-B1(P)	90-100	9
2.	(Dh 3-20 x PI 405132)F2-B4-B1-B3	100	9
3.	(MGS 9 x 2-5)F2-B2-B1-B1 x NC 3033)F2-B1-B1-B3	100	9
4.	(Manfredi x PI 405132)F2-B1-B1	100	9

RUST RESISTANT LINES -F5 GENERATION

1.	(TMV 2 x NC Ac 17506)F3-B1-B1	100	
2.	(Robut 33-1 x NC Ac 2821)F2-B2-B1-B1 x NC Ac 17090)F2-B1-B1-B1	100	9
3.	(Robut 33-1 x NC Ac 17506)F3-B1-B1	90	9
4.	(Robut 33-1 x NC Ac 17133)F3-B1-B1	100	9
5.	(Florigiant x NC Ac 17506)F2-P1-B1-B1	100	9
6.	(Robut 33-1 x NC Ac 17133)F3-B1-B1	100	9
7.	(TMV 2 x 17506)F3-B1-B1	90	9
8.	(Robut 33-1 x NC Ac 17133)F3-B1-B2	90	9
9.	(Robut 33-1 x Krap.St.16)F3-B1-B1	100	9
10.	(TMV 2 x NC Ac 17133)F2-B1-B1-B1	100	9
11.	(Robut 33-1 x NC Ac 17133)F3-B1-B1	100	9
12.	(Robut 33-1 x NC Ac 17133)F3-B1-B1	100	9
13.	(NC 6 x DHT 200)F2-B1-B1-B1	100	9
14.	(TMV 2 x Krap.St.16)F3-B1-B1	100	9
15.	(TMV 2 x NC Ac 17133)F3-B3-B2	100	9
16.	(Robut 33-1 x DHT 200)F2-B1-B1-B2	100	9

RUST RESISTANT LINES -F6 GENAERATION

1.	(Argentine x NC Ac 17090)F2-B2-B2-B2-B1	100	9
2.	(NC Ac 2564 x NC Ac 17090)F2-P3-B1-B1-B1	85-100	9
3.	(MGS 9 x EC 76446(292))F2-B1-B2-B1-B1	100	9
4.	(MGS 9 x NC Ac 17090)F2-B2-B1-B2-B1	100	9
5.	(Dh 3-20 x NC Ac 17090)F2-B1-B1-B1-B2	100	9
6.	(OG 69-6-1 x NC Ac 17090)F2-B1-P1-B1-B1	100	9
7.	(X 9-2-B-25-B x EC 76446(292))F2-B1-B1-B1-B1	100	9
8.	(GAUG 1 x NC Ac 17090)F2-B2-P1-B1-B1	100	9
9.	(Starr x NC Ac 17090)F2-B1-B1-B1-B1	100	9
10.	(G 37 x EC 76446(292))F2-B2-B1-B2-B1	100	9
11.	(53-68 x PI 259747)F2-B1-B1-B2-B1	100	9
12.	(Dh 3-20 x NC Ac 17090)F2-B1-B1-B1-B1	100	9
13.	(MH 1 x EC 76446(292))F2-B1-P1-B1-B1	100	9
14.	(M 145 x NC Ac 17090)F2-B1-B1-B1-B1	100	9
15.	(Ah 8254 x NC Ac 17090)F2-B1-B2-B1-B1	100	9
16.	(MGS 7 x NC Ac 17090)F2-B1-P1-B1-B1	100	9
17.	(FSB 7-2 x NC Ac 17090)F2-B1-P1-B1-B1	100	9
18.	(Argentine x NC Ac 17090)F2-B1-B1-B1-B1	100	9
19.	(NG 268 x EC 76446(292))F2-B1-B2-B1-B1	100	9
20.	(GAUG 1 x EC 76446(292))F2-B1-B2-B1-B1	100	9
21.	(OG 69-6-1 x NC Ac 17090)F2-B1-P1-B1-B1	100	9
22.	(GAUG 1 x NC Ac 17090)F2-B1-B2-B1-B1	100	9
23.	(Dh 3-20 x EC 76446(292))F2-B1-B1-B1-B1	100	9
24.	(Ah 8254 x NC Ac 17090)F2-B1-B2-B1-B1	100	9
25.	(Faizpur 1-5 x NC Ac 17090)F2-B1-B1-B1-B1	100	9
26.	(NC AC 2564 x NC Ac 17090)F2-P28-B1-B1-B1	80-100	9
27.	(Starr x NC AC 17090)F2-B1-P2-B1-B1	75-100	9
28.	(Argentine x NC Ac 17090)F2-B1-B1-B1-B2	100	9

29.	(JH 89 x NC Ac 17090)F2-B1-B1-B1-B1	100	9
30.	(Ah 8254 x EC 76446(292))F2-B1-B2-B1-B1	85	9
31.	(HG 1 x EC 76446(292))F2-B1-P1-B1-B1	100	9
32.	(Ah 65 x Ec 76446(292))F2-B1-B2-B1-B1	100	9
33.	(Florigiant x NC Ac 17090)F2-B1-B1-B1-B2	100	9
34.	(Ah 32 x NC Ac 17090)F2-B2-B1-B1-B1	100	9
35.	(M 145 x NC Ac 17090)F2-B2-B2-B1-B1	100	9
36.	(Ah 65 x NC Ac 17090)F2-B1-B2-B1-B1	100	9
37.	(FSB 7-2 x NC Ac 927)F2-B1-B1-B1-B1(Tan)	100	9
38.	(FSB 7-2 x NC Ac 927)F2-B1-B1-B1-B1(Purple)	100	9
39.	(NC 17 x EC 76446(292)F2-B1-B1-B1-B1	100	9
40.	(NC-Fla-14 x EC 76446(292))F2-B1-B1-B1-B1	100	9
41.	(JH 89 x NC Ac 17090)F2-B1-B1-B1-B2	100	9
42.	(OG 1-13-3 x EC 76446(292)F2-B1-B2-B1-B1	100	9
43.	(MGS 7 x EC 76446(292))F2-P2-B1-B1-B1	100	9
44.	(TG 3 x EC 76446(292)F2-B1-B1-B1-B1	100	9
45.	(TG 14 x NC Ac 17090)F2-B1-B2-B1-B1	100	9
46.	(JH 335 x EC 76446(292))F2-B2-B2-B1-B1	78-100	9
47.	(SM 5 x NC Ac 17090)F2-B1-B1-B1-B1	100	9
48.	(SM 1 x NC Ac 17090)F2-B1-B1-B1-B1	100	9
49.	(MGS 8 x EC 76446(292))F2-B1-B2-B1-B1	100	9
50.	(JH 335 x NC Ac 17090)F2-B1-B2-B1-B1	100	9
51.	(JH 171 x EC 76446(292))F2-B1-B2-B1-B1	100	9
52.	(NC 17 x NC Ac 17090)F2-B1-B1-B1-B1	100	9
53.	(MGS 9 x NC Ac 17090)F2-B1-B2-B1-B1	100	9
54.	(NC Ac 400 x NC Ac 17090)F2-B1-B2-B1-B1	100	9

RUST RESISTANT LINES -F7 GENERATION

1.	(M145 x NC Ac 17090)F2-B2-B2-B2-B1-B1	100	9
2.	(JH89 x PI 259747)F2-B5-B2-B1-B1-B1	100	9
3.	(JH 60 x EC 76446(292))F2-B2-B1-B1-B1-B1	100	9
4.	(NC Ac 1107 x NC Ac 17090)F2-B1-B1-B1-B1-B2	100	9
5.	(M 145 x EC 76446(292))F2-B1-B1-B1-B1-B2	85	9
6.	(JH 89 x EC 76446(292))F2-B1-B1-B2-B1-B1	85	9
7.	(C 148 x NC AC 17090)F2-B2-B1-B2-B1-B1	100	9
8.	(Dh 3-20 x EC 76446(292)F2-B2-R2-B1-B1-B1	100	9
9.	(Argentine x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
10.	(FSB 7-2 x PI259747)F2-P27-P1-B1-B1-B1	100	9
11.	(OG 71-3 x PI 259747)F2-B2-B1-B1-B1-B1	100	9
12.	(AH 32 x NC AC 17090)F2-B1-B1-B1-B1-B1	100	9
13.	(Comet x NC AC 17090)F2-B1-B1-B1-B1-B1	100	9
14.	(Ah 8254 x NC Ac 17090)F2-B1-B2-B2-B1-B1	80	9
15.	(MGS 8 x EC 76446(292))F2-B1-B2-B1-B1-B1	100	9
16.	(TG 14 x EC 76446 (292))F2-B1-B1-B1-B1-B1	100	9
17.	(SM 5 x EC 76446(292))F2-B1-B2-B1-B1-B1	100	9
18.	(MK 374 x PI 298115)F2-B1-B2-B2-B1-B1	100	9
19	(JH 171 x NC AC 17090)F2-B1-B1-B1-B2-B1	100	9
20.	(Faizpur 1-5 x NC Ac 17090)F2-B3-B2-B1-B1-B1	100	9
21.	(NC AC 1107 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
22.	(G 37 x NC Ac 17090)F2-P1-B1-B1-B1-B2	80	9
23.	(MGS 7 x EC 76446(292))F2-B1-B1-B1-B1-B1	85	9
24.	(HG 1 x PI 259747)F2-B1-B1-B2-B1-B1	95	9
25.	(NC Ac 2190 x NC Ac 17090) F2-B1-B2-B1-B1-B1	85-100	9
26.	(JH 171 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
27.	(NC-Fla-14 x NC Ac 17090)F2-B2-B1-B1-B1-B1	100	9
28.	(MGS 8 x EC 76446(292))F2-B1-B1-B2-B1-B1	100	9

29.	(Starr x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
30.	(X-2-25-B x EC 76446(292))F2-B1-B2-B1-B1-B1	100	9
31.	(HG 1 x EC 76446(292))F2-B1-B1-B2-B1-B1	100	9
32.	(MH 1 X EC 76446(292))F2-B1-B2-B2-B1-B1	100	9
33.	(JH 60 x NC Ac 17090)F2-B1-B1-B1-B1-B2	100	9
34.	(NC -Fla-14 x NC Ac 17090)F2-B1-B2-B2-B1-B1	100	9
35.	(NC 17 x NC Ac 17090)F2-B2-B1-B1-B1-B1	100	9
36.	(RS 114 x PI 259747)F2-B1-B1-B2-B1-B1	100	9
37.	(TG 17 x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
38.	(Comet x NC Ac 17090)F2-B1-B1-B1-B1-B1	85	9
39.	(MH 1 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
40.	(Dh 3-20 x EC 76446(292))F2-B1-B1-B1-B1-B1	100	9
41.	(G 37 x NC Ac 17090)F2-P1-B1-B1-B1-B1	100	9
42.	(NC AC 2190 x PI 259747)F2-B2-B1-B1-B1-B1	80-90	9
43.	(NC-Fla-14 x NC Ac 17090)F2-B2-B2-B2-B1-B1	80	9
44.	(Shantung KU.NO.208 x EC 76446(292))F2-B1-B1-B2-B1-B1	100	9
45.	(NC Ac 2190 x NC Ac 17090)F2-B1-B2-B1-B1-B1	100	9
46.	(G 37 x EC 76446(292))F2-B1-B1-B1-B1-B1	100	9
47.	(Faizpur 1-5 x NC Ac 17090)F2-B2-B2-B1-B1-B1	100	9
48.	(MH 1 x NC Ac 17090)F2-B1-B2-B1-B1-B1	100	9
49.	(JH 60 x NC Ac 17090)F2-B1-B1-B1-B1-B2	100	9
50.	(NC Ac 2564 x NC Ac 17090)F2-B2-B1-B1-B1-B1	100	9
51.	(NG 268 x PI 259747)F2-B1-B1-B2-B1-B1	100	9
52.	(X 41-X-X-1-B x EC 76446(292))F2-B1-B1-B2-B1-B1	100	9
53.	(Florigiant x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
54.	(Comet x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
55.	(MGs 9 x EC 76446 (292)F2-B1-B2-B1-B1	100	9
56.	(NC -Fla-14 x EC 76446(292))F2-B2-B1-B1-B1-B1	100	9

57.	(Argentine x NC Ac 17090)F2-B1-B2-B1-B1-B1	100	9
58.	(NC AC 2564 x NC Ac 17090)F2-P23-B1-B1-B1-B1	100	9
59.	(MGS 9 x EC 76446(292)F2-B2-B1-B1-B1-B1	100	9
60.	(Starr x NC Ac 17090)F2-B1-B2-B1-B1-B1	100	9
61.	(NC Ac 2731 X PI 259747)F2-B2-B1-B1-B1-B1	100	9
62.	(SM 1 x PI 259747)F2-B1-B1-B1-B1-B1	100	9
63.	(X 40-X-X-3-B x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
64.	(RS 114 x EC 76446(292)F2-B2-B1-B2-B1-B1	100	9
65.	(53-68 x EC 76446(292))F2-B2-B1-B2-B1-B1	100	9
66.	(99-5 X NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
67.	(Dh 3-20 x EC 76446(292))F2-B2-B1-B1-B1-B1	100	9
68.	(NG 268 x NC Ac 17090)F2-B2-B1-B2-B1-B1	100	9
69.	(SM 1 x PI 259747)F2-B1-B1-B1-B1-B1	100	9
70.	(NC AC 2190 x PI 259747)F2-B2-B1-B1-B1-B1	100	9
71.	(Ah 65 x NC Ac 17090)F2-B2-B1-B1-B1-B1	75-100	9
72.	(JH 60 x EC 76446(292)F2-B2-B1-B1-B1-B1	100	9
73.	(Nc Ac 1107 x EC 76446(292)) F2-B1-B1-B1-B1-B1	100	9
74.	(HG 1 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
75.	(53-68 x EC 76446(292))F2-B1-B1-B1-B1-B1	100	9
76.	(FSB 7-2 x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
77.	(G 37 x EC 76446(292))F2-B1-B2-B1-B1-B1	100	9
78.	(NC AC 2768 x PI 259747)F2-B2-B1-B2-B1-B1	100	9
79.	(TG 17 x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
80.	(NC Ac 2190 x NC Ac 17090)F2-B1-B2-B1-B1-B1	90-100	9
81.	(TG 3 x NC Ac 17090)F2-B2-B1-B2-B1-B1	40-80	-
82.	(53-68 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
83.	(G 37 x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
84.	(NC Ac 1107 x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9

85.	(OG 69-6-1 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
86.	(Ah 32 x PI 259747)F2-B1-B1-B1-B1-B1	100	9
87.	(JH 171 x NC Ac 17090)F2-B2-B1-B2-B1-B1	100	9
88.	(Ah 8254 x PI 259747)F2-B2-B1-B2-B1-B1	100	9
89.	(53-68 x NC AC 17090)F2-B1-B1-B1-B1-B1	100	9
90.	(MGS 8 x EC 76446(292))F2-B1-B1-B2-B1-B1	100	9
91.	(G 37 x NC AC 17090)F2-B1-B1-B2-B1-B1	100	9
92.	(X9-2-B-25-B x PI 259747)F2-B1-B1-B2-B1-B1	100	9
93.	(Comet x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
94.	(Ah 8254 x NC Ac 17090)F2-B2-B1-B2-B1-B1	100	9
95.	(NC AC 2564 x NC Ac 17090)F2-P23-B1-B1-B1-B1	100	9
96.	(Ah 32 x NC Ac 17090)F2-B1-B1-B1-B1-B1	100	9
97.	(JH 335 x NC Ac 17090)F2-B1-B2-B1-B1-B1	100	9
98.	(JH 171 x NC Ac 17090)F2-B1-B2-B1-B1-B1	100	9
99.	(JH 60 x EC 76446(292)F2-B2-B1-B2-B1-B1	100	9
100	(Var.2750 x EC 76446(292)F2-B1-B2-B1-B1-B1	100	9
101.	(MGS 8 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
102.	(53-68 x EC 76446 (292)F2-B2-B1-B1-B1-B1	100	9

RUST RESISTANT LINES -F8 GENERATION

1.	(Shantung KU NO. 203 x EC 76446 (292)) F2-B1-B1-B1-B1-B1-B1	100	9
2.	(Faizpur 1-5 x NC Ac 17090)F2-B2-B2-B2-B1-B1-B1	100	9
3.	(TG 3 X PI 259747)F2-P16-B1-B1-B1-B1-B1	100	9
4.	(MH 1 X NC Ac 17090)F2-B1-B1-B2-B1-B1-B1	100	9
5.	(NC Ac 2190 X NC Ac 17090)F2-B1-B2-B1-B1-B2-B1	100	9
6.	(HG 1 x NC Ac 17090)F2-B1-B1-B2-B1-B1-B1	100	9
7.	(Ah 32 x NC Ac 17090)F2-B1-P1-B1-B1-B1-B1	100	9

8.	(GAUG 1 x NC Ac 17090)F2-B1-B1-B2-B1-B1-B1	100	9
9.	(MGS 7 x EC 76446(292))F2-B1-B1-B2-B1-B1-B2	100	9
10.	(JH 89 x NC Ac 17090)F2-B1-B2-B2-B1-B1-B1	100	9
11.	(JH 60 x NC Ac 17090)F2-B1-B1-B1-B1-B1-B1	100	9
12.	(SM 5 x EC 76446(292)F2-B1-B2-B1-B1-B1-B1	100	9
13.	(NC- Fla-14 x EC 76446 (292))F2-B2-B1-B2-P1-B1-B1	100	9
14.	(GAUG 1 x PI 259747)F2-B2-B1-B2-P1-B1-B1	100	9
15.	(Dh 3-20 x PI 259747)F2-P1-P2-B2-B1-B3-B1	100	9
16.	(MGS 9 x EC 76446(292))F2-B2-B1-B2-P1-B1-B1	100	9
17.	(JH 335 x NC Ac 17090)F2-B1-B1-B2-B1-B1-B1	100	9
18.	(NC Ac 2190 x NC Ac 17090)F2-B1-B2-B1-B1-B1-B1	100	9
19.	(Dh 3-20 x EC 76446 (292)F2-B2-B1-B1-B1-B1-B1		

RUST RESISTANT LINES -F9 GENERATION

1.	(X 9-2-B-25-B X PI 259747)F2-PP-B1-B1-B2-P2-B1-B1(Tan)	100	9
2.	(Chico x PI 259747)F2-B1-P1-B1-B1-P1-B1-B1	100	9
3.	(Dh 3-20 x PI 259747)F2-P75-P1-B1-B2-B2-B1-B1	100	9
4.	(Ah 6279 x PI 259747)F2-B1-B4-B1-B2-B1-B1-B1	80	9
5.	(X 9-2-B-25-B x PI259747)F2-P9-P6-B1-B2-P1-B1-B1(Purple)	100	9
6.	FESR 11 -P13-B1-B2-B2-B1-B1-B1-B1-B1-B1	100	9

RUST RESISTANT LINES -YIELD TRIAL

1.	(TG 17 x PI 259747)F2-PPB1-B1-B2-B1-B1-B1	100	9
2.	(NC-Fla-14 x PI 259747)F2-PP-B1-B2-B2-B3-B1-B1	100	9
3.	(JH 60 x PI 259747)F2-B1-B1-B1-B2-B1-B1-B1	85	9

4.	(Ah 8254 x PI 259747)F2-P4-P1-B1-B2-B1-B1-B1	100	9
5.	(HG 1 x NC Ac 17090)F2-B2-B1-B2-B1-B1-B1	100	9
6.	(Ah 32 x NC Ac 17090)F2-B1-B1-B2-B1-B1	100	9
7.	(Comet x NC Ac 17090)F2-B2-B1-B2-B1-B1-B1	100	9
8.	(Shantung KU.No. 203 x EC 76446(292))F2-B1-B1-B2-B1-B1-B1	100	9
9.	(NC Ac 400 x EC 76446 (292))F2-B1-B1-B2-B1-B1-B1	100	9
10.	FESR 11-P17-B1-B1-B1-B1-B1-B1-B1-B1	85	9
11.	(Faizpur 1-5 x NC AC 17090)F2-B1-B2-B1-B1-B1-B1	100	9
12.	(JH 89 X EC 76446 (292))F2-B1-B1-B2-B1-B1-B1	90	9
13.	(Dh 3-20 x PI 259747)F2-P75-P1-B1-B2-B2-B1-B1	95	9
14.	(NC Ac 2768 x NC Ac 17090)F2-B1-B1-B2-B1-B1	90	9
15.	(Florigiant x NC Ac 17090)F2-B1-B1-P1-B1-B1	100	9
16.	(NC Ac 2190 x NC Ac 17090)F2-B1-B2-B1-B2-B2	85	9
17.	(G 37 x EC 76446(292))F2-B1-B2-B1-B2-B1	90	9
18.	(Dh 3-20 x NC Ac 17090)F2-B1-B2-P1-B1-B1	100	9
19.	(JH 89 x NC Ac 17090) F2-B1-B1-B1-B1-B1	100	9
20.	(TG 3 x EC 76446(292))F2-B1-B1-B1-B1-B1-B1	100	9
21.	J 11	100	9
22.	Robut 33-1	95	9
23.	NC Ac 17090	90	9
24.	Spancross	100	9
25.	Chalimbana	85	9
26.	Mani Pintar	85	9
27.	RG 1	90	9
28.	SAC 58	90	9
29.	E 879/614	90	9
30.	Egret	100	9

HIGH YIELD AND QUALITY -F3 GENERATION

1.	(Goldin x Faizpur 1-5) x (Manfredi x M 13)F2-B1	100	9
2.	(GAUG 1 x NC Ac 17090) x (Robut 33-1 - 10-3-B1-B1-B1-B1)F2-B1	100	9
3.	(G 37 x PI 259747) x (Robut 33-1 - 21-11-B1-B1-B1-B1)F2-B1	100	9
4.	(HG 1 x EC 76446(292)) x (Robut 33-1 -10-3-B1-B1-B1-B1)F2-B1	100	9
5.	(MGS 8 x Robut 33-1) x (Robut 33-1 - 10-3-B1-B1-B1-B1)F2-B1	100	9
6.	(MK 374 x Robut 33-1) x (Robut 33-1 x NC Ac 316)F2-B1	100	9
7.	(NC Ac 17352) x (Goldin 1 x Faizpur 1-5)F2-B1	100	9
8.	(NC Ac 17352) x (Robut 33-1 - 21-11-B1-B1-B1-B1)F2-B1	100	9
9.	(Robut 33-1 -21-11-B1-B1-B1-B1) x 877 F2-B1	100	9
10	(Robut 33-1 x 905)F2-B1	100	9
11.	(Robut 33-1 -21-11-B1-B1-B1-B1) x (Manfredi x M13)F2-B1	100	9
12.	(Robut 33-1 x NC Ac 2821) x (Goldin 1 x Faizpur 1-5)F2-B1	100	9
14.	(Tifspan x G 201)F2-B1	100	9
15.	(Robut 33-1 x NC Ac 2821) x (USA 20 x TMV 10) F2-B1	85	9
16.	(MK 374 x Robut 33-1) x (53-68(France) x Robut 33-1)F2-B1	100	9
17.	(Robut 33-1 x NC Ac 2821) x (USA 20 x TMV 10)F2-B2	80	9
18.	(Goldin 1 x Faizpur 1-5) x (Manfredi x M 13)F2-B1	90	9
19.	(Goldin 1 x Faizpur 1-5) x (Manfredi x M 13)F2-B3	100	9
20.	(USA 20 x TMV 10) x (Robut 33-1 -10-3-B1-B1-B1-B1)F2-B2	100	9
21.	(Robut 33-1 -21-11-B1-B1-B1-B1) x (Manfredi x M 13)F2-B1	100	9
22.	(Robut 33-1 -21-11-B1-B1-B1-B1) x (Manfredi x M 13)F2-B2	100	9
23.	(MGS 8 x Robut 33-1) x (Robut 33-1 x NC Ac 2821)F2-B1	100	9
24.	(MGS 8 x Robut 33-1) x (Robut 33-1 x NC Ac 316)F2-B2	100	9
25.	(53-68 x Robut 33-1) x (Robut 33-1 x NC Ac 316) F2-B1	100	9
26.	(53-68 x Robut 33-1) x (Robut 33-1 x NC Ac 316)F2-B2	100	9
27.	(MK 374 x Robut 33-1) x (Robut 33-1 x NC Ac 316)F2-B1	100	9

28.	(Mk 374 x Robut 33-1) x (Robut 33-1 x NC Ac 316)F2-B2	100	9
29.	(MK 374 x Robut 33-1) x (53-68 x Robut 33-1) F2-B1	100	9
30.	(MK 374 x Robut 33-1) x (53-68 x Robut 33-1)F2-B2	100	9
31.	(MK 374 x Robut 33-1) x (53-68 x Robut 33-1)F2-B3	100	9
32.	(Robut 33-1 x 865)F2-B3	100	9
33.	(Robut 33-1 x 935)F2-B1	80	9
34.	(Robut 33-1 x 944)F2-B1	80	9

HIGH YIELD AND QUALITY -F4 GENERATION.

1.	(Ah 8254 x MH2)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B1-B1	100	9
2.	(Ah 8254 x MH2)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B2-B1	100	9
3.	(Ah 8254 x MH2)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B2-B2	100	9
4.	(Ah 8254 x MH2)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B2-B3	100	9
5.	(Ah 8254 x MH2)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B2-B4	100	9
6.	(Colorado Manfredi x L.No.95A)F2-B1-B1(Red)	100	9
7.	(Colorado Manfredi x L.No.95A)F2-B2-B1	100	9
8.	(Colorado Manfredi x L.No.95A)F2-B2-B2	80-100	9
9.	(Comet x TG 16)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B1-B1	100	9
10.	(Comet x TG 16)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B1-B2	100	9
11.	(Comet x TG 16)F2E-B2-B1-B1-B1 x L.No.95-A)F2-B1-B3	80-100	9
12.	(FSB 7-5 x L.No.95-A)F2-B1-B1	85-100	9
13.	(Gangapuri x L.No.95-A)F2-B1-B1	80-100	9
14.	(Gangapuri x L.No.95-A)F2-B1-B2	100	9
15	(Goldin 1 x Faizpur 1-5)F2-P5-B1-B1-B1-B1-B1 x L.No.95-A F2-B1-B2	100	9
16.	(Jacana x L.No.95-A)F2-B2-B1	100	9
17.	(Jacana x L.No.95-A)F2-B2-B2	100	9

18.	(Jacana x L.No.95-A)F2-B2-B3	100	9
19.	(SM 1 x Dh 3-20)F2-P2-B1-B1-B1 x L.No.95-A)F2-B1-B1	100	9
20.	(SM 1 x Dh 3-20)F2-P2-B1-B1-B1 x L.No.95-A)F2-B1-B2	100	9
21.	(SM 1 x Dh 3-20)F2-P2-B1-B1-B1 x L.No.95-A)F2-B1-B3	100	9
22.	(JL 24 x L.No.95-A)F2-B1-B1	100	9
23.	(JL 24 x L.No.95-A)F2-B1-B2	100	9
24.	(Robut 33-1 x Shantung KU NO.203)F2-B1-B1	100	9
25.	(Shantung KU No.203 x Robut 33-1)F2-B1-B1	100	9

HIGH YIELD AND QUALITY -F5 GENERATION

1.	(Ah 114 x NC Ac 1107)F2-B3-B1-B2	100	9
2.	(BP 1 x J 11)F2-B1-B1-B1	100	9
3.	(Chalimbana x SM 5)F2-B1-B2-B2(Red)	100	9
4.	(Chico x Ah 330)F2-B4-B1-B1	100	9
5.	(Chico x NC Ac 344)F2-B1-B1-B1	100	9
6.	(Chico x NC Ac 344)F2-B2-B1-B1	100	9
7.	(Chico x NC Ac 2123)F2-B1-B1-B1	100	9
8.	(Chico x NC Ac 2123)F2-B1-B1-B2	100	9
9.	(Dh 3-20 x Ah 330)F2-B2-B1-B1	100	9
10.	(Dh 3-20 x F334 A-B-14)F2-B1-B1-B1	90	9
11.	(Dh 3-20 x F334 A-B-14)F2-B2-B1-B1	100	9
12.	(Dh 3-20 x F334 A-B-14)F2-B2-B1-B2	100	9
13.	(Dh 3-20 x F334 A-B-14)F2-B2-B1-B3	100	9
14.	(Dh 3-20 x NC Ac 344)F2-B2-B1-B1	100	9
15.	(Faizpur 1-5 x Ah 330)F2-B1-B1-B1	100	9
16.	(Faizpur 1-5 x Ah 330)F2-B5-B1-B1	100	9

17.	(Faizpur 1-5 x Ah 330)F2-B5-B1-B2	100	9
18.	(Faizpur 1-5 x Ah 330)F2-B5-B1-B3	85	9
19.	(Faizpur 1-5 x NC Ac 2123)F2-B1-B1-B1	100	9
20.	(Faizpur 1-5 x NC Ac 2123)F2-B1-B1-B4	100	9
21.	(Faizpur 1-5 x NC Ac 2123)F2-B3-B1-B2	100	9
22.	(Faizpur 1-5 x NC Ac 2123)F2-B3-B1-B4	100	9
23.	(Faizpur 1-5 x Sigaropink)F2-B1-B1-B1	100	9
24.	(FSB 7-5 x 75-23)F2-B3-B1-B1	100	9
25.	(FSB 7-5 x 75-23)F2-B3-B1-B2	100	9
26.	(FSB 7-5 x 75-23)F2-B3-B1-B3	100	9
27.	(FSB 7-5 x 75-23)F2-B4-B1-B1	100	9
28.	(Goldin 1 x Ah 330)F2-B1-B1-B1	90	9
29.	(Goldin 1 x Ah 330)F2-B1-B1-B2	85	9
30	(Goldin 1 x F 334A-B-14)F2-B3-B1-B2	-	-
31.	(Goldin 1 x Sigaropink)F2-B2-B1-B1	95	9
32.	(J 11 x HG 1)EF2-B1-B1-B1	100	9
33.	(J 11 x HG 1)EF2-B1-B1-B2	100	9
34.	(J 11 x HG 1)EF2-B1-B1-B3	100	9
35.	(J 11 x Faizpur 1-5)F2-B1-B2-B1 x Colorado	100	9
	Manfredi)EF2-B1-B1-B1	100	9
36.	(J 11 x Faizpur 1-5)F2-B1-B2-B1 x Colorado	100	9
	Manfredi)EF2-B1-B1-B2	100	9
37.	(J 11 x Faizpur 1-5)F2-B1-B2-B1 x Colorado	100	9
	Manfredi)EF2-B1-B1-B3(Red)	100	9
38.	(J 11 x Faizpur 1-5)F2-B1-B2-B1 x Colorado	100	9
	Manfredi)EF2-B1-B1-B4(Red)	100	9
39.	(J 11 x Faizpur 1-5)F2-B1-B2-B1 x Manfredi)F2-B1-B1-B1	100	9
40	(J 11 x Faizpur 1-5)F2-B1-B2-B1 x Manfredi)F2-B1-B1-B2	100	9

41	(J 11 x Faizpur 1-5)F2-B1-B2-B1 x Manfredi)F2-B1-B1-B3	100	9
42.	(JL 24 x G.D.Mutant)EF2-B1-B2-B3	100	9
43.	(JL 24 x G.D.Mutant)F2-B3-B1-B1	100	9
44.	(JL 24 x G.D.Mutant)F2-B3-B1-B2	100	9
45.	(JL 24 x G.D.Mutant)F2-B3-B1-B3	100	9
46.	(JL 24 x G.D.Mutant)F2-B3-B1-B4	100	9
47.	(JL 24 x HG 1)F2-B1-B1-B1	100	9
48.	(JL 24 x NC Ac 17352)F2-B4-B1-B2	100	9
49.	(JL 24 x (72-R x 2-5)F2-P1-B1-B1)EF2-B1-B1-B1	100	9
50.	(Makulu Red x J 11)F2-B2-B1-B1	100	9
51.	(Makulu Red x J 11)F2-B2-B1-B2	100	9
52.	(Manfredi x F334 A-B-14)F2-B2-B1-B1	100	9
53.	(Manfredi x F334 A-B-14)F2-B2-B1-B2	100	9
54.	(Manfredi x F334 A-B-14)F2-B2-B1-B4	100	9
55.	(Manfredi x F334 A-B-14)F2-B2-B1-B1(Red)	100	9
56.	(Manfredi x F334 A-B-14)F2-B5-B1-B1	100	9
57.	(Manfredi x F334 A-B-14)F2-B5-B1-B2	100	9
58.	(MGS 9 X 2-5)F2-P5-B1-B1-B1 x Kanyama)F2-B1-B1-B2	100	9
59	(Mani Pintar x 91176)F2-B2-B1-B2	100	9
60	(RMP 91 x Dh 3-20)F2-B1-B1-B1	100	9
61.	(RMP 91 x Dh 3-20)F2-B1-B1-B2	100	9
62.	(Robut 33-1 x G.D.Mutant)F2-B1-B1-B2	100	9
63.	(Robut 33-1 x G.D.Mutant)F2-B1-B2-B2	100	9
64.	(Robut 33-1 x Jacana)F2-B4-B1-B1	100	9
65.	(Robut 33-1 x Jacana)F2-B5-B1-B1	100	9
66.	(Robut 33-1 x Jacana)F2-B5-B1-B3	100	9
67.	(Robut 33-1 x Jacana) F2-B5-B1-B4	100	9
68.	(Robut 33-1 x NC Ac 2821)F2-P1-B1-B1 x Kanyama)F2-B1-B1-B2	85	9

69.	(Robut 33-1 x NC Ac 2821)F2-P1-B1-B1 x Kanyama)F2-B1-B1-B3	80-100	9
70.	(Robut 33-1 x NC Ac 2821)F2-P1-B1-B1 x Kanyama)F2-B1-B1B5	100	9
71.	(Robut 33-1 x Nc Ac 2821)F2-P1-B1-B1 x NC 6)F2-B3-B1-B1	85	9
72.	(SM 5 x NC Ac 17500)F2-B1-B1-B2	100	9
73.	(T 64 x NC Ac 1107)F2-B1-B1-B1	100	9
74.	(Tifspan x NC Ac 2944)F2-P4-B1-B1-B1 x Robut 33-1)F2-B1-B1-B2	100	9
75.	(Tifspan x NC Ac 2944)F2-P4-B1-B1-B1 x Robut 33-1)F2-B1-B1-B3	100	9
76.	(1176 x NC Ac 2123)F2-B1-B1-B2	100	9
77.	(1176 x NC Ac 2123)F2-B1-B1-B3	100	9
78.	(1176 x NC Ac 2123)F2-B3-B1-B1	100	9
79.	(Robut 33-1 x NC AC 2821)F2-P2-B1-B1 x NC 6)F2-B1-B1-B2	100	9
80.	(Robut 33-1 x L.No.95-A)F2-B1-B1-B1	100	9
81.	(Manfredi x F 334 A-B-14)F2-B1-B1-B1	100	9
82.	(Manfredi x F 334 A-B-14)F2-B1-B1-B2	100	9
83.	(Robut 33-1 x Jacana)F2-B1-B1-B2	100	9
84.	(FSB 7-2 x 75-23)F2-B1-B1-B1	100	9
85.	(M13 x S.KU.No.203)F2-B1-B1-B1	100	9
86.	(MH2 x MK 374)F2-B1-B1-B1(Red)	100	9
87.	(MH2 x NC Ac 2731)F2-B1-B1-B2	100	9
88.	(MH2 x TG 16)F2-B1-B1-B1	100	9
89.	(MH2 x 28-206)F2-B1-B1-B3(Red)	100	9
90.	(MH2 x Shantung KU.No.203)F2-B1-B1-B2	85	9
91.	(MK 374 x MH2)F2-B1-B1-B1	100	9
92.	(MK 374 x MH2)F2-B1-B1-B2	100	9
93.	(MK 374 x NC Ac 2768)F2-B1-B1-B2	90	9
94.	(MK 374 x POL.2)F2-B1-B1-B1	90	9
95.	(MK 374 x TG 16)F2-B1-B1-B1	100	9
96.	(NC Ac 1107 x NC AC 2768)F2-B1-B1-B3	100	9

97.	(NC Ac 1107 x Argentine)F2-B1-B1-B1	100	9
98.	(NC Ac 1107 x Argentine)F2-B1-B1-B2	100	9
99.	(NC Ac 2731 x POL. 2)F2-B1-B1-B1	100	9
100.	(NC Ac 2768 x M 13)F2-B1-B1-B1	100	9
101.	(NC Ac 2768 x POL.2)F2-B1-B1-B1	100	9
102.	(NC Ac 2768 x POL.2)F2-B1-B1-B2	100	9
103.	(NC Ac 2768 x POL.2)F2-B1-B1B2(Red)	100	9
104.	(NC Ac 2768 x Florunnr)F2-B1-B1-B1	100	9
105.	(POL.2 x MK 374)F2-B1-B1-B1	100	9
106.	(GAUG 1 x Robut 33-1)F3-B1-B2	100	9
107.	(GAUG 1 x Robut 33-1)F3-B1-B1	100	9
108.	(Robut33-1 x Florunner)F3-B1-B1	100	9
109.	(Robut 33-1 x Florunner)F3-B1-B2	100	9
110.	(Florunner x Robut 33-1)F3-B1-B1	100	9
111.	(Florunner x Robut 33-1)F3-B1-B2	100	9
112.	(Robut 33-1 x NC Ac 2731)F3-B1-B1	100	9
113.	(Robut 33-1 x NC Ac 2731)F3-B1-B2	100	9
114.	(Argentine x MK 374)F3-B1-B1	100	9
115.	(TG 16 x GAUG1)F3-B1-B1	100	9
116.	(Goldin 1 x F 334A-B-14)F2-B1-B1-B1	100	9
117.	(M 13 x NC Ac 17352)F2E-B1-B1-B1	100	9
118.	(Robut 33-1 x F 334A-B14)F2-B1-B1-B1	100	9
119.	(Goldin 1 x Sigaropink)F2-B1-B1-B1	100	9
120.	(TG 16 x M 13)F2-B1-B1-B1	100	9
121.	(TG 16 x MH 2)F2-B1-B1-B1	100	9
122.	(GAUG 1 x Robut 33-1)F2-B1-B1-B1	100	9
123.	(GAUG 1 x Gangapuri)F2-B2-B1-B1	100	9
124.	(GAUG 1 x NC Ac 1107)F2-B1-B1-B1	100	9

125.	(GAUG 1 x NC Ac 2731)F2-B1-B1-B1	100	9
126.	(GAUG 1 x TG 16)F2-B1-B1-B1	100	9
127.	(GAUG 1 x TG 16)F2-B1-B1-B2	100	9
128.	(Shantung KU.No.203 x TG 16)F2-B1-B1-B3	100	9
129.	(Robut 33-1 x GAUG 1)F3-B1-B1	100	9
130.	(Robut 33-1 x GAUG 1)F3-B1-B2	100	9

HIGH YIELD AND QUALITY -F6 (L)

1.	(Faizpur 1-5 x F334-A-B-14)F2-B2-B2-B1	100	9
2.	(Gangapur x MK 374)F2-B1-B4-B1-B1(Red)	100	9
3.	(Goldin 1 x Faizpur 1-5)F2-P5-B1-B1-B1 x Manfredi)F2-B2-B1-B1-B1	100	9
4.	(Goldin 1 x NC 3033)F2-B1-B1-B1-B2	100	9
5.	(Tifspan x NC Ac 2944)F2-P4-B1-B1-B1 x G.D.Mutant)EF2-B1-B1-B1-B2	100	
6.	(Tifspan x NC Ac 2944)F2-P4-B1-B1-B1 x G.D.Mutant)EF2-B1-B1-B2-B2	100	
7.	(Tifspan x NC Ac 2944)F2-P4-B1-B1-B1 x G.D.Mutant)EF2-B1-B1-B2-B4(Red)	100	
8.	(Tifspan x NC Ac 2944)F2-P4-B1-B1-B1 x NC Ac 3033)F2-B1-B1-B1-B1	100	

HIGH YIELD AND QUALITY -F6 (C)

1.	(Dh 3-20 x Jacana)F2-B1-B1-B1-B1	100	9
2.	(Gangapur x NC Ac 17500)F2-B1-B1-B1-B1	100	9
3.	(Goldin 1 x HG 1)F2-B1-B1-B1-B1	100	9

4.	(Goldin 1 x NC 3033)F2-B3-EB1-B1-B1	100	9
5.	(HG 1 x Faizpur 1-5)F2-EB1-B1-B1 x (TMV 7 x FSB 7-2) F2-P3-B1-B1-B1)F2-B1-B1-B1-B1	100	9
6.	(HG 1 x Faizpur 1-5)F2-EB1-B1-B1 x (TMV 7 x FSB 7-2)F2-P3-B1-B1-B1)F2-B1-B1-B1-B2	100	9
7.	(HG 1 x Faizpur 1-5)F2-EB1-B1-B1 x (TMV 7 x FSB 7-2)F2-P3-B1-B1-B1)F2-B1-B1-B1-B3	100	9

HIGH YIELD AND QUALITY -F7 GENERATION (L)

1.	(Ah 114 xGangapuri)F2-B1-B2-B3-B1-B3	100	9
2.	(Chalimbana x Dh 3-20)F2-B1-B2-B1-B1-B1	100	9
3.	(Manipintar x Dh 3-2-)F2-B2-B2-B1-B1-B1	100	9
4.	(Ah 114 x HG 1)F2-B1-B2-B2-B1-B2	100	9
5.	(Ah 114 x HG 1)F2-B1-B2-B2-B1-B3	100	9
6.	(Makulu Red x Dh 3-20)F2-B1-B2-B1-B1-B1	100	9
7.	(Makulu Red x M 13)F2-B1-B2-B1-B1-B1	100	9
8.	(Mani Pintar x Faizpur 1-5)F2-B1-B2-B3-B1-B1	100	9
9.	(Mani Pintar x Faizpur 1-5)F2-B1-B2-B3-B1-B3	100	9
10.	(Mani Pintar x Faizpur 1-5)F2-B1-B2-B3-B1-B4	100	9
11.	(Mani Pintar x Faizpur 1-5)F2-B1-B2-B3-B1-B5	100	9
12.	(M 13 x Gangapuri)F2-B1-B2-B1-B1-B1	100	9
13.	(M 13 x Gangapuri)F2-B1-B2-B1-B1-B3	100	9
14.	(M 13 x Gangapuri)F2-B2-B2-B1-B1-B1	100	9
15.	(NC Ac 3033 x FSB 7-2)F2-B1-B2-B1-B1-B1	100	9
16.	(RMP 12 x Gangapuri)F2-B1-B2-B1-B1-B1	100	9
17.	(RMP 12 x Gangapuri)F2-B1-B2-B1-B1-B2	100	9
18.	(RMP 12 x Gangapuri)F2-B1-B2-B2-B1-B1	100	9

19.	(RMP 12 x Manfredi)F2-B1-B2-B1-B1-B3	100	9
20.	(RMP 12 x Manfredi)F2-B1-B2-B1-B1-B4	100	9
21.	(RMP 12 x Dh 3-20)F2-B1-B2-B1-B1-B1	100	9
22.	(RMP 12 x Manfredi)F2-B1-B2-B2-B1-B1	100	9

HIGH YIELD AND QUALITY -F 9 (L) GENERATION

1.	(Ah 2105 x TMV 10)F2-P1-B1-B1-B2-B1-B1-B1	85	9
2.	(Ah 6279 x Florigiant)LF2-B2-B1-B1-B2-B1-B1-B1	100	9
3.	(Ah 6279 x NC Ac 310)EF2-B1-B1-B1-B2-B1-B1-B1	100	9
4.	(AH 6279 x NC Ac 1107)LF2-B1-B1-B1-B2-B1-B1-B1	100	9
5.	(Ah 8254 x M 13)LF2-B1-B1-B1-B2-B1-B1-B1	100	9
6.	(Ah 8254 x M 13)LF2-B1-B1-B1-B2-B1-B1-B2	100	9
7.	(Comet x M 13)LF2-B2-B1-B1-B2-B1-B1-B2	100	9
8.	(Florunner x NG 1)LF2-B1-B1-B1-B2-B1-B1-B1	100	9
9.	(Florigiant x SM 5)LF2-B2-B1-B1-B2-B2-B1-B1	100	9
10.	(Florigiant x TG 16)LF2-B1-B1-B1-B2-B2-B1-B2	100	9
11.	(Florigiant x TG 17)LF2-B1-B1-B1-B2-B5-B1-B1	100	9
12.	(Gangapuri x NC-FLA-14)LF2-B3-B1-B1-B2-B2-B1-B1	100	9
13.	(Gangapuri x NC-FLA-14)LF2-B3-B1-B1-B2-B2-B1-B2	100	9
14.	(Gangapuri x NC-FLA-14)LF2-B3-B1-B1-B2-B2-B1-B4	100	9
15.	(GAUG 1x NC-FLA-14)LF2-B2-B1-B2-B2-B2-B1-B1	100	9
16.	(GAUG 1 x NC Ac 310)LF2-B1-B1-B1-B2-B2-B1-B2	100	9
17.	(M 13 X Comet)LF2-B2-B1-B1-B2-B1-B1-B1	100	9
18.	(M 13 x Comet)LF2-B3-B1-B1-B2-B1-B1-B1	100	9
19.	(M 13 x TG 1)LF2-B2-B1-B1-B2-B1-B1	100	9
20.	(M 13 x TG 1)LF2-B2-B1-B1-B2-B1-B2	100	9
21.	(NC AC 1107 x Ah 8254)F2-P1-B1-B1-B2-B1-B1-B1	100	9

22.	(NC Ac 1107 x Spancross)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
23.	(NC AC 1107 x Spancross)LF2-B1-B1-B1-N1B2-B1-B1-B2	100	9
24.	(NC Ac 1107 x Spancross)LF2-B1-B1-B1-N1B2-B1-B1-B3	100	9
25.	(NC Ac 1107 x 72-R)EF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
26.	(NC Ac 475 x M 13)LF2-P1-B1-B1-N1B2-B1-B1-B1	100	9
27.	(NC AC 475 x 28-206)LF2-B1-B1-B1-N1B2-B1-B1-B2	100	9
28.	(NC AC 2654 x NC AC 310)LF2-B2-B1-B1-N1B2-B1-B1-B1	100	9
29.	(NC Ac 2654 x 28-206)LF2-P1-B1-B1-N1B2-B1-B1-B1	100	9
30.	(NC Ac 2821 x MH 2)LF2-B1-B1-B1-N1B2-B2-B1-B1	100	9
31.	(NC Ac 2821 x TG 16)EF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
32.	(NC Ac 17113 x M 13)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
33.	(NC Ac 17113 x 28-206)LF2-P2-B1-B1-N1B2-B1-B1-B1	100	9
34.	(NC AC 310 x MH 1)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
35.	(NC Ac 310 x M 13)LF2-B1-B1-B1-B2-B1-B1-B1	80	9
36.	(NC Ac 310 x NC Ac 2821)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
37.	(NC Ac 310 x Spancross)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
38.	(NC AC 310 x Spancross)LF2-B1-B1-B1-N1B2-B1-B1-B2	100	9
39.	(NC Ac 2543 x NC Ac 2821)LF2-B2-B1-B1-B2-B1-B1-B1	100	9
40	(NC Ac 2543 x Spancross)F2-B3-B1-B1-N1B2-B1-B1-B1(Red)	100	9
41.	(NC Ac 2543 x X 14-4-B-19-B)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
42.	(NC Ac 2543 x TG 1)LF2-B1-B1-B1-B2-B1-B1-B1	100	9
43.	(NC-FLA-14 x Spancross)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
44.	(NC-FLA-14 x TG 16)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
45.	(NC-FLA-14 x TG 16)LF2-B1-B1-B1-N1B2-B1-B1-B2	100	9
46.	(NC AC 2731 x Spancross)LF2-B2-B1-B1-N1B2-B1-B1-B1	100	9
47.	(POl.2 x NC-FLA-14)LF2-B1-B1-B1-N1B2-B2-B1-B1	100	9
48.	(POL.2 xFlorigiant)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
49.	(Shulamith x Ah 8254)EF2-B1-B1-B1-N1B2-B1-B1-B1	100	9

50	(Shulamith x Ah 8254)EF2-B1-B1-B1-N1B2-B2-B1-B1	100	9
51.	(Shulamith x MH 2)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
52.	(Shulamith x NC Ac 310)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
53.	(Shulamith x Spancross)LF2-B3-B1-B1-N1B2-B1-B1-B1	100	9
54.	(Shulamith x SM 5)LF2-B2-B1-B1-N1-B2-B1-B1-B1	100	9
55.	(Shulamith x TG 17)LF2-B1-B1-B1-B2-B1-B1-B1	100	9
56.	(Shulamith x TG 17)LF2-B1-B1-B1-B2-B1-B1-B2	100	9
57.	(Spancross x TG 14)LF2-P2-B1-B1-N1B2-B2-B1-B1	100	9
58.	(SM 5 x NC AC 1107)EF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
59.	(SM 5 x NC Ac 1107)EF2-B1-B1-B1-N1B2-B1-B1-B2	100	9
60.	(MH 2 x 28-206)LF2-B2-B1-B1-N1B2-B1-B1-B1	100	9
61.	(MH 2 x 28-206)LF2-B2-B1-B1-N1B2-B1-B1-B1	100	9
62.	(Shantung KU.NO.203 x NC AC 310)LF2-B1-B1-B1-N1B2-B1-B1-B1	100	9
63.	(72-R x M 13)EF2-B1-B1-B1-N1B2-B4-B1-B1-B1	100	9
64.	(72-R x M 13)EF2-B1-B1-B1-N1B2-B4-B1-B2	100	9
65.	(72-R x 28-206)LF2-B1-B1-B1-N1B2-B1-B1-B2	100	9
66.	(NC AC 2654 x Comet)LF2-B3-B1-B1-B2-B1-B1-B2(Red)	100	9
67.	(NC Ac 2654 x Comet)LF2-B3-B1-B1-B2-B1-B1-B3	100	9
68	(NC Ac 2654 x Comet)LF2-B3-B1-B1-B2-B1-B1-B2(Pale Tan)	100	9
69.	(NC Ac 2821 x MH 2)EF2-B1-B1-B1-NB2-B1-B1-B1	100	9
70.	(NC AC 2462 x MH 2)LF2-B2-B1-B1-B2-B1-B1-B1	100	9
71.	(NC-FLA-14 x M 13)F2-B2-B1-B1-B2-B1-B1-B1	100	9
72.	(NC Ac 2543 x NC Ac 2821)LF2-B2-B1-B1-B1-B1-B1-B1	100	9
73.	(NC Ac 2543 x 28-206)LF2-B1-B1-B1-B2-B1-B1-B1	100	9
74.	(Star x MH 2)EF2B1-B1-B1-B2-B1-B1-B1	100	9
75.	(Florunner x TG 17)LF2-B2-B1-B1-B2-B1-B1-B1	100	9
76.	(Florunner x TG 17)LF2-B2-B1-B1-B2-B1-B1-B2	100	9
77.	(Florigiant x NC AC 1107)F2-B1-B1-B1-B2-B1-B1-B1	100	9

HIGH YIELD AND QUALITY -F9 GENERATION (E)

1.	(Argentine x NC Ac 2821)F2L-B1-B1-B1-EB2-B2-B1-B1	100	9
2.	(Argentine x NC Ac 2821)F2L-B1-B1-B1-EB2-B2-B1-B2	100	9
3.	(Argentine x NC Ac 2821)F2L-B1-B1-B1-EB2-B2-B3-B1	100	9
4.	(Argentine x TG 17)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
5.	(Ah 6279 x Spancross)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
6.	(Ah 6279 x SM 5)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
7.	(Ah 6279 x SM 5)F2L-B1-B1-B1-B2-B2-B1-B1-B1	100	9
8.	(Ah 6279 x TG 16)F2L-P1-B1-B1-B2-B2-B2-B2	100	9
9.	(Ah 6279 x TG 16)F2L-P1-B1-B1-B2-B2-B2-B1	100	9
10.	(Ah 6279 x TG 16)F2L-B1-B1-B1-B2-B2-B1-B1	100	9
11.	(Ah 8254 x MH 2)F2E-B1-B1-B1-B2-B1-B3-B1	100	9
12.	(Ah 8254 x MH 2)F2L-P1-B1-B2-B2-B1-B1-B1	100	9
13.	(Ah 8254 x MH 2)F2L-B3-B1-EB1-B2-B2-B1	100	9
14.	(Ah 8254 x MH 2)F2L-B3-B1-EB1-B2-B2-B1	100	9
15.	(Ah 8254 x MH 2)F2L-B3-B1-B1-B2-B1-B1-B1	100	9
16.	(Ah 8254 x MH 2)F2L-B3-B1-EB2-B2-B1-B1-B1	100	9
17.	(Ah 8254 x MH 2)F2L-B3-B3-B2-B2-B1-B1-B1	100	9
18.	(Comet x M 13)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
19.	(Comet x NC Ac 1107)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
20.	(Comet x Manfredi)F2L-P1-B1-B2-B2-B1-B2	100	9
21.	(Gangapuri x MH 1)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
22.	(Gangapuri x MH 1)F2E-B1-B1-B1-B2-B1-B2-B1	100	9
23.	(Gangapuri x MH 1)F2E-B1-B1-B1-B2-B1-B4-B1	100	9
24.	(GAUG 1 x SM 5)F2E-B2-B1-B1-B2-B1-B1-B1	100	9

25.	(GAUG 1 x SM 5)F2E-B2-B1-B2-B2-B1-B1-B1	100	9
26.	(MH 1 x MH 2)F2E-B1-B1-B1-B2-B1-B2-B1	100	9
27.	(MH 1 x MH 2)F2E-B1-B1-B1-B2-B1-B6-B2	100	9
28.	(MH 1 x MH 2)F2E-B1-B1-B1-B2-B1-B5-B1	100	9

HIGH AND QUALITY = YIELD TRIAL

1.	(Argentine x Ah 8254)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
2.	(Ah 6279 x MH 2)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
3.	(Ah 8254 x MH 2)F2L-B3-B1-B1-B2-B1-B1-B1	100	9
4.	(Argentine x Shulamit)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
5.	(Ah 6279 x SM 5)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
6.	(Ah 6279 x SM 5)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
7.	RRI/1	80	9
8.	(Ah 6279 x TG 16)F2L-B3-B1-B1-B2-B1-B1-B1	100	9
9.	(Comet x Spancross)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
10.	(Comet x Spancross)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
11.	(Comet x SM 5)F21- B2-B1-B1-B2-B1-B1-B1	100	9
12.	(Comet x TG 16)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
13.	(Gangapuri x NC AC 529)F2E-B2-B1-B1-B2-B1-B1-B1	100	9
14.	(GAUG 1 x NC-FLA 14)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
15.	(GAUG 1 x NC-FLA 14)F2E-B2-B1-B1-B2-B1-B1-B1	100	9
16.	(GAUG 1 x NC Ac 529)F2E-P1-B1-B1-B2-B1-B1-B1	100	9
17.	(GAUG 1 x Starr)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
18.	(MH 1 x SM 5)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
19.	(MH 1 x SM 5)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
20.	(MH 1 x TG 16)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
21.	(MH 1 x TG 16)F2L-B2-B2-B1-B1-B2-B1-B1-B1	100	9

22.	(MH 2 x NC Ac 2654)F2E-B2-B1-B1-B2-B1-B1-B1	100	9
23.	(NC Ac 975 x JH 171)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
24.	(NC Ac 2654 x NC Ac 1107)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
25.	(NC Ac 975 x NC Ac 2654)F2E-B3-B1-B1-B2-B1-B1-B1	100	9
26.	(Nc Ac 975 x NC Ac 2654)F2E-B4-B1-B1-B2-B1-B1-B1	100	9
27.	(NC Ac 975 x NC Ac 2654)F2E-B5-B1-B1-B2-B1-B1-B1	100	9
28.	(NC Ac 475 x Spancross)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
29.	(NC Ac 475 x Spancross)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
30.	(NC Ac 475 x SM 5)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
31.	(NC Ac 475 x SM 5)F2E-B2-B1-B1-B2-B1-B1-B1	100	9
32.	(NC Ac 475 x SM 5)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
33.	(NC Ac 975 x SM 5)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
34.	(Spancross x Ah 6279)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
35.	(Spancross x Ah 6279)F2E-B2-B1-B1-B2-B1-B1-B1	100	9
36.	(Spancross x Tifspan)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
37.	(Spancross x TG 16)F2-P1-B1-B1-B2-B1-B1-B1	100	9
38.	(Spancross x TG 16)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
39.	(Spancross x X 14-4-B-19-B)F2E-B3-B1-B1-B2-B1-B1-B1	100	9
40	(SM 5 x Ah 6279)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
41.	(SM 5 x MH 2)F2E-B1-B1-B1-B2-B1-B1-B1	90	9
42.	(SM 5 x MH 2)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
43.	(SM 5 x MH 2)F2L-B4-B1-B1-B2-B1-B1-B1	100	9
44.	(Spancross x SM 5)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
45.	(SM 5 x TG 16)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
46.	(SM 5 x TG 16)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
47.	(Starr x MH 2)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
48.	(Starr x Spancross)F2E-B2-B1-B1-B2-B1-B1-B1	100	9
49.	(Starr x SM 5)F2E-B2-B1-B1-B2-B1-B1-B1	100	9

50.	(Starr x SM 5)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
51.	(Starr x TG 16)F2E-B1-B1-B2-B1-B1-B1-B1	100	9
52.	(Starr x TG 16)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
53.	(Tifspan x SM 5)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
54.	(Tifspan x SM 5)F2E-B2-B1-B1-B2-B1-B1-B1	100	9
55.	(X 14-4-B-19-B x SM 5)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
56.	(Var.72-R x Spancross)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
57.	(Var.72-R x TG 16)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
58.	Robut 33-1	95	9
59.	JL 24	100	9
60.	J 11	100	9
61.	Spancross	100	9
62.	Mani Pintar	85	9
63.	Chalimbana	90	9
64.	RG 1	90	9

HIGH YIELD AND QUALITY (SB) - YIELD TRIAL

1.	Manfredi xRobut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	100	9
2.	(MGS 7 x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	100	9
3.	(MGS 7 x Robut 33-1)F2-B2-B1-B1-B1-B1-B1-B1	100	9
4.	(Robut 33-1 x Tifspan)F2E-B1-B1-B1-B1-B1-B1-B1	100	9
5.	(Robut 33-1 x Tifspan)F2E-B2-B1-B1-B1-B1-B1-B1	100	9
6.	(Tifspan x Robut 33-1)F2E-B1-B1-B1-B1-B1-B1-B1	100	9
7.	(Var.72-R x Robut 33-1)F2L-B4-B1-B1-B1-B1-B1-B1	100	9
8.	(Robut 33-1 x Comet)F2-B1-B1-B1-B1-B1-B1-B1	100	9
9.	(2-5 x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	100	9
10.	(Ah 8254 x TG 16)F2E-B2-B1-B1-B2-B1-B1-B1	100	9

11.	(NC Ac 2543 x Comet)F2L-B3-B1-B1-B1-B2-B1-B1	100	9
12.	(NC Ac 2462 x M 13)F2L-P1-B1-B1-B2-B1-B1-B1	100	9
13.	(NC Ac 2462 x M 13)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
14.	(NC Ac 2462 x MH 2)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
15.	(NC Ac 2462 x TG 1)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
16.	(NC Ac 2462 x TG 1)F2L-B2-B1-B1-B2-B1-B1-B1	100	9
17.	(NC-FLA-14 x TG 16)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
18.	(Florigiant x TG 16)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
19.	(MH 1 x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	100	9
20.	(Spancross x TG 14)F2L-P2-B1-B1-N1B2-B1-B1-B1	100	9
21.	(GAUG 1 x NC Ac 310)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
22.	Malimba	100	9
23.	(NC Ac 2462 x TG 1)F2L-B1-B1-B1-N1B2-B1-B1-B1	100	9
24.	(NC Ac 17113 x Spancross)F2L-B1-B1-B2-N1B2-B2-B1-B1	100	9
25.	(SM 5 x MH 2)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
26.	J 11	100	9
27.	Robut 33-1	95	9
28.	JL 24	100	9
29.	Spancross	100	9
30.	Sellie	100	9
31.	RG 1	85	9
32.	Egret	95	9

EARLINESS -F6 GENERATION (L)

1.	(NC AC 1107 x 91776)F2-B1-B1-B1-B1	85	9
2.	(NC Ac 1107 x 91776)F2-B1-B1-B1-B2	100	9
3.	(Robut 33-1 x FESR 13-P14-B1-B1-B1-B1)F2-B1-B1-B1	100	9

4.	(Robut 33-1 x NC Ac 17352)F2-B1-B2-B1-B1	100	9
5.	(Robut 33-1 x Sigaropink)F2-B1-B1-B1-B1	100	9
6.	(Robut 33-1 x Sigaropink)F2-B1-B1-B1-B3	100	9
7.	(Robut 33-1 x 91776)F2-B1-B1-B1-B1	100	9
8.	(Robut 33-1 x NC Ac 2821)F2-P2-B1-B1-B1 x Colorado Manfredi) F2-B1-B1-B1-B1	80	
9.	(Robut 33-1 x NC Ac 2821)F2-P2-B1-B1-B1 x Colorado Manfredi) F2-B1-B1-B1-B2	100	
10.	(RObut 33-1 x NC Ac 2821)F2-P2-B1-B1-B1 x Colorado Manfredi) F2-B1-B1-B1-B3	100	
11.	(Robut 33-1 x NC Ac 2821)F2-P2-B1-B1-B1 x Manfredi 68)F2-B1-B1-B1-B1	100	
12.	(Robut 33-1 x NC Ac 2821)F2-P2-B1-B1-B1 x Manfredi 68)F2-B2-B2-P1-B1	100	
13.	(Robut 33-1 x NC Ac 2821)F2-P2-B1-B1-B1 x NC 3033)F2-B1-B2-B1-B1	100	

EARLINESS -F7 GENERATION (L)

1.	(Ah 114x 91176)F2-P1-B2-B1-B1-B1	100	9
2	(Chalimbana x Robut 33-1)F2-B1-B2-B1-B1-B1	100	9
3.	(Chalimbana x Robut 33-1)F2-B1-B2-B1-B1-B2	85	9
4.	(Chalimbana x Chico)F2-B1-B2-B1-B1-B2	100	9
5.	(Chalimbana x Chico)F2-B1-B2-B2-B1-B1	85	9
6.	(CDM 1 x 91176)F2-P1-B2-B1-B1-B2	100	9
7.	(Florigiant x Robut 33-1)F2-B1-B2-B1-B1-B1	100	9

8.	(Florigiant x Robut 33-1)F2-B1-B2-B1-B1-B2	100	9
9.	(Florigiant x Robut 33-1)F2-B1-B2-B2-B1-B1	100	9
10.	(Florigiant xRobut 33-1)F2-B1-B2-B2-B1-B2	100	9
11.	(Florigiant x Robut 33-1)F2-B1-B2-B2-B1-B1	100	9
12.	(Makulu Red x Robut 33-1)F2-B1-B2-B1-B1-B1	100	9
13.	(Makulu Red x Robut 33-1)F2-B1-B2-B1-B1-B1	100	9
14.	(Chalimbana x 91776)F2-B1-B2-B2-B1-B1	100	9
15.	(Chalimbana x 91776)F2-B1-B2-B2-B1-B2	100	9
16.	(CDM 1 x 91176)F2-P1-B2-B1-B1-B1	100	9
17.	(M 13 x 91776)F2-B1-B2-B1-B1-B1	100	9
18.	(Florigiant x 91176)F2-P1-B2-B2-B1-B2	100	9
19.	(Makulu Red x Chico)F2-B1-B2-B1-B1-B1	100	9
20.	(Makulu Red x Chico)F2-B1-B2-B1-B1-B2	100	9
21.	(Makulu Red x Chico)F2-B1-B2-B1-B1-B3	100	9
22.	(Robut 33-1 x 91776)F2-B1-B2-B1-B1-B2	100	9
23.	(RMP 12 x 91176)F2-B1-B2-B1-B1-B1	100	9
24.	(RMP 89 x 91176)F2-B2-B2-B1-B1-B2	100	9
25.	(RMP 91 x Robut 33-1)F2-B1-B2-B1-B1-B1	100	9
26.	(RMP 91 x Robut 33-1)F2-B1-B2-B1-B1-B2	100	9
27.	(72-23 x Robut 33-1)F2-B1-LB2-B1-B1-B1	100	9
28.	(72-23 x Robut 33-1)F2-B1-LB2-B1-B1-B2	100	9
29.	(72-23 x RObut 33-1)F2-B1-LB2-B1-B1-B3	100	9
30.	(73-32 x Robut 33-1)F2-B1-B2-B1-B1-B1	100	9
31	(73-32 x Robut 33-1)F2-B1-B2-B1-B1-B2	100	9
32.	(73-32 x 91776)F2-B1-B2-B2-B1-B1	100	9
33.	(73-32 x 91776)F2-B1-B2-B2-B1-B2	100	9
34.	(73-32 x 91776)F2-B1-B2-B2-B1-B3	100	9
35.	(73-32 x 91776)F2-B1-B2-B2-B1-B4	100	9

36.	(73-32 x 91776)F2-B1-B2-B2-B1-B5	100	9
37.	(75-24 x Chico)F2-P1-B2-B1-B1-B1	100	9
38.	(75-24 x Robut 33-1)F2-P1-B2-B1-B1-B1	100	9

HIGH YIELD AND QUALITY -F9 (VB) - YIELD TRIAL

1	(Goldin 1 x 91776)F2-B1-B1-B1-B1-B1-B1-B1	90	9
2.	(Robut 33-1 x Spancross)F2-B1-B1-B1-B1-B1-B1-B1	100	9
3.	(Starr x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	100	9
4.	(28-206 x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	90	9
5.	(Ah 6279 x Florigiant)F2L-B1-B1-B1-B2-B1-B1-B1	95	9
6.	(Florigiant x NC Ac 1107)F2L-B2-B1-B1-B1-B2-B1-B1	90	9
7.	(Florigiant x Spancross)F2L-B2-B1-B1-B1-B1-B1	100	9
8.	(Florigiant x Spancross)F2L-B2-B1-B1-B1-B2-B1-B1	100	9
9.	(Florigiant x SM 5)F2-B1-B1-B1-B2-B1-B1-B1	100	9
10.	(NC Ac 2462 x Florigiant)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
11.	(NC Ac 2821 x MH 2)F2E-B1-B1-B1-B2-B1-B1-B1	100	9
12.	(NC Ac 1107 x NC Ac 310)F2L-P1-B1-B1-B2-B1-B1-B1	85	9
13.	(NC-FLA-14 x M 13)F2LB2-B1-B1-B2-B1-B1-B1	100	9
14.	(NC-FLA-14 x NC Ac 1107)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
15.	(NC Ac 2821 x Tifspan)F2L-B1-B1-B1-B2-B1-B1	100	9
16.	(NC Ac 310 x 28-206)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
17.	(NC Ac 17113 x 28-206)F2L-B4-B1-B1-B2-B1-B1-B1	100	9
18.	Shantung(KU.No.203 x Shulamit)F2-B2-B2-B1-B1-B2-B2-B1	100	9
19.	J 11	100	9
20	Robut 33-1	100	9
21.	JL 24	100	9

22.	Chalimbana	90	9
23.	Mani Pintar	85	9
24.	E789/6/4-E879/6/4	90	9
25.	SAC 58	90	9
26.	RG 1	85	9

HIGH XIELD AND QUALITY -F 10 GENERATION (L)

1	(Ah 6279 x JH 62)F2-B1-B1-B1-N1B2-B1-B1-B1	100	9
2.	(Ah 6279 x JH 62)F2-B1-B1-B1-N1B2-B1-B1-B2	100	9
3.	(EC 21888 x NC Ac 475)F2-B1-B1-B1-B1-N1B2-B1-B1-B1	100	9
4.	(EC 21888 x NC Ac 316)F2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
5.	(Faizpur 1-5 x NC Ac 316)F2-B1-B1-B1-B1-N1-B2-B2-B1-B1	100	9
6.	(J 11 x TMV 10)F2-B2-B1-B1-B2-N1-B2-B1-B1-B1	100	9
7.	(JH 62 x M 13)F2-B1-B1-B1-B1-N1B2-B1-B1-B1	100	9
8.	(JH 62 x NC Ac 2785)F2-B2-B1-B1-B1-N1B2-B1-B1-B2	100	9
9.	(J 11 x NC Ac 316)F2-B1-b1-B1-B2-N1B2-B1-B1-B1	100	9
10.	(J 11 x JH 62)F2-B4-B1-B1-B1-N1B2-B1-B1	100	9
11.	(J 11 x JH 62F2-B4-B1-B1-B1-N1B2-B1-B2	100	9
12.	(NC-PLA-14 X Ah 6279)F2-P1-B1-B1-B1-N1B2-B1-B1-B1	100	9
13.	(NC Ac 311 x Ah 8254)F2-B2-B1-B1-B1-N1-B2-B1-B1	100	9
14.	(NC Ac 311 x Ah 8254)F2-B2-B1-B1-B1-N1-B2-B2-B1-B2	100	9
15.	(NC Ac 311 x HG 1)F2-B1-B1-B1-B1-B1B2-B1-B1-B1	100	9
16.	(NC Ac 311 x HG 1)F2-B1-B1-B1-B1-N1-B2-B2-B1-B1	100	9
17.	(NC Ac 316 x NC Ac 2785)F2-B1-B1-B1-B1-N1B2-B1-B1-B1	100	9
18.	(Nc 17 x 148-7-4-3-12-B)F2-B1-B1-B1-B1-B1B2-B1-B1-B1	100	9
19.	(NC 17 x 148-7-4-3-12-B)F2-B1-B1-B1-B1-N1B2-B1-B1-B2	100	9
20.	(Spancross x NC Ac 2785)F2-B3-B1-B1-B1-N1B2-B1-B1-B2	100	9

21.	(TG 17 x Gangapuri)F2-B2-B1-B1-B1-N1B2-B1-B1-B1	100	9
22.	(TG 17 x NC Ac 2785)F2-B2-B1-B1-B1-N1B2-B1-B1-B1	100	9
23.	(TG 17 x NC Ac 2785)F2-B2-B1-B1-B1-N1B2-B1-B1-B2	100	9
24.	(TG 17 x 53-68)F2-B3-B1-B1-B1-N1B2-B1-B1-B1	100	9
25.	(TG 17 x 53-68)F2-B3-B1-B1-B1N1-B2-B2-B1-B1	100	9
26.	(TG 18 x 48-115)F2-B1-B1-B1-B1-N1B2-B2-B1-B1	100	9
27.	(NC Ac 2731 x Faizpur 1-5)F2-B3-B1-B1-B1-B1-B1-B1-B1	100	9
28.	(NC Ac 316 x NC Ac 310)F2-B1-B1-B1-B1-B1-B1-B1-B1	100	9

HIGH YIELD AND QUALITY -F10 GENERATION (VB): YIELD TRIAL

1.	(Goldin 1 x Robut 33-1)F2-P1-B1-B1-B1-B2-B1-B1-B1	100	9
2.	(JH 335 x Robut 33-1)F2-B1-B1-B1-B1-B2-B1-B1-B1	100	9
3.	(M 13 x Robut 33-1)F2-P1-B1-B1-B1-B2-B1-B1-B1	100	9
4.	(M 13 x Robut 33-1)F2-P2-B1-B1-B1-B2-B1-B1-B1	100	9
5.	(MGS 7 x Robut 33-1)F2L-B1-B1-B1-B1-B2-B1-B1-B1	100	9
6.	(MGS 8 x Robut 33-1)F2-P1-B1-B1-B1-B2-B1-B1-B1	100	9
7.	(NC Ac 1107 x Robut 33-1)F2-P2-B1-B1-B1-B2-B1-B1-B1	100	9
8.	(Robut 33-1 x M 13)F2-B1-B1-B1-B1-B2-B1-B1-B1	100	9
9.	(Robut 33-1 x M 13)F2-B1-B1-B1-B1-B2-B1-B1-B1	100	9
10.	(Robut 33-1 x NC Ac 316)F2-B1-B1-B1-B1-B2-B1-B1-B1	100	9
11.	(TMV 10 x Robut 33-1)F2-P5-B1-B1-B1-B2-B1-B1-B1	100	9
12.	(Robut 33-1 x NC Ac 2821)F2-P1-B1-B1-B1-B2-B1-B1-B1	100	9
13.	(M 13 x Robut 33-1)F2-B1-B1-N1B1-B1-B1-B1-B1-B1	100	9
14.	(MK 374 x Robut 33-1F2-B1-B1N1-B1-B1-B1-B1-B1-B1	100	9
15.	(NC Ac 1107 x Robut 33-1)F2-B1-B2N1-B1-B1-B1-B1-B1-B1	100	9
16.	(JH 335 x Chico)F2-B1-B1-B1-B1N1-B1-B1-B1-B1	100	9
17.	Chalimbana	85	9

18.	Mani Pintar	85	9
19.	Robut 33-1	100	9
20.	JL 24	100	9
21.	SAC 58	90	9
22.	E 879/6/4	90	9
23.	Egret	95	9
24.	RG 1	90	9

HIGH YIELD AND QUALITY -F11 GENERATION : YIELD TRIAL

1.	H 3/7	90	9
2.	(Dh 30-20 x USA 20)F2-P1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
3.	(FSB 7-2 x NC Ac 2821)F2-P3-B1-B1-B1-B1-B1-B1-B1-B1	100	9
4.	(JH 89 x NC AC 2821)F2-P1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
5.	(Manfredi x NC AC 750)F2-B1-B-B2-B1-B1-B1-B1-B1-B1-B1	100	9
6.	(NC-FLA-14 x Faizpur 1-5)F2-P1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
7.	(NC-FLA-14 x NC Ac 17142)F2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
8.	(Robut 33-1 x NC Ac 2821)F2-P2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
9.	(Robut 33-1 x NC AC 2821)F2-B3-B1-B1-B1-B1-B1-B1-B1-B1	100	9
10,	(RObut 33-1 x NC Ac 2698)F2-B2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
11.	(Spancross x NC Ac 400)F2-B2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
12.	(USA 20 x TMV 10)F2-P3-B1-B1-B1-B1-B1-B1-B1-B1	100	9
13.	Robut 33-1-12-10-B1-B1-B1-B1-B1-B1-B1	100	9
14.	Robut 33-1-11-7-B1-B1-B1-B1-B1-B1-B1	100	9
15.	Robut 33-1-1-5-B1-B1-B1-B1-B1-B1-B1	100	9
16.	Robut 33-1-13-6-B1-B1-B1-B1-B1-B1-B1	100	9
17.	Robut 33-1-11-15-P5-B1-B1-B1-B1-B1-B1-B1	100	9

18.	Robut 33-1-27-20-B1-B1-B1-B1-B1-B1-B1	100	9
19.	(14-8-7-4-3-12-B x 72-R)F2-P5-B1-B1-B1-B1-B1-B1-B1-B1	100	9
20.	(J 11 x Faizpur 1-5)F2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
21.	(MGS 7 x SM 5)F2-B1-B2-B1-B1-B1-B1-B1-B1-B1	100	9
22.	(Tifspan x NC Ac 2944)F2-P2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
23.	(72-R x 2-5)F2-P1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
24.	(55-437 x MGS 7)F2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
25.	(X 14-4-3-8-B x POL 2)F2-P1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
26.	(MGS 9 x 2-5)F2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
27.	(MGS 8 x NC A)F2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
28.	(2-5 x NC Ac 741)F2-B5-B2-B1-B1-B1-B1-B1-B1-B1	100	9
29.	(Manfredi x X-14-4-B-19-B)F2-P12-B1-B1-B1-B1-B1-B1-B1-B1	100	9
30.	(NC Ac 741 x X-9-2-B-25-B)F2-P1-P1-B1-B1-B1-B1-B1-B1-B1	100	9
31.	J 11	100	9
32.	Robut 33-1	100	9
33.	JL 24	100	9
34.	Spancross	100	9
35.	Sellie	100	9
36.	RG 1	85	9
37.	Egret	90	9

YIELD TRIAL - ICGS LINES

1.	Robut 33-1-7-4-B1-B1-B1-B1-B1-B1-B1	100	9
2.	(Goldin 1 x Faizpur 1-5)F2-P6-B1-B1-B1-B1-B1-B1-B1	100	9
3.	(Argentine x NC AC 2158)F2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
4.	(Robut 33-1-7-6-B1-B1-B1-B1-B1-B1-B1	100	9
5.	(Robut 33-1 x NC Ac 316)F2-B2-N1-B1-N1B1-B1-B1-B1-B1	100	9

6.	(MGS 8 x Robut 33-1)F2-B2-B1-B1-B1-N1B1-B1-B1-B1-B1	100	9
7.	(TMV 7 x FSB 7-2)F2-B1-B2-B1-B1-B1-B1-B1-B1-B1	100	9
8.	(Tifspan x NC Ac 2944)F2-P4-B1-B1-B1-B1-B1-B1-B1-B1	100	9
9.	(Ah 65 x Robut 33-1)F2-P2-B1-B1-B1-B1-B1-B1-B1	100	9
10.	(NC Ac 2953 x X-14-4-B-19-B)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
11.	Robut 33-1-16-8-B1-B1-B1-B1-B1-B1-B1	100	9
12.	Robut 33-1-10-3-B1-B1-B1-B1-B1-B1-B1-B1	100	9
13.	Chalimbana	85	9
14.	(JH 89 x Robut 33-1)F2-B2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
15.	(TMV 7 x Robut 33-1)F2-P4-B1-B1-B1-B1-B1-B1-B1	100	9
16.	(Ah 2105 x Chico)EF2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
17.	(Shulamith x Robut 33-1)F2-B1-B1-B1-N1B1-B1-B1-B1-B1	100	9
18.	(Robut 33-1 x NC Ac 316)F2-P1-B1-B1-N1B1-B1-B1-B1-B1	100	9
19.	(MK 374 x Robut 33-1)F2-B2-B1-N1B1-B1-B1-B1-B1	100	9
20.	(TMV 10 x Robut 33-1)F2-B1-B1-B1-N1B1-B1-B1-B1-B1-B1	100	9
21.	(Robut 33-1 x NC Ac 2598)F2-B2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
22.	(Robut 33-1 x NC Ac 2821)EF2-P5-B1-B1-B1-B1-B1-B1-B1-B1	100	9
23.	(Robut 33-1 x NC Ac 2821)EF2-P2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
24.	(Robut 33-1 x NC Ac 2821)F2-P1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
25.	(Robut 33-1 x NC Ac 2821)F2-B2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
26.	(Robut 33-1 x NC Ac 2821)F2-B4-B1-B1-B1-B1-B1-B1-B1-B1	100	9
27.	(Robut 33-1 x NC Ac 2821)EF2-B1-B1-B1-B1-B1-B1-B1-B1-B1	100	9
28.	(TG 17 x Robut 33-1)EF2-B3-B1-B1-B1-B1-B1-B1	100	9
29.	(NC AC 1107 x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	100	9
30.	(AH 2105 x Chico)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
31.	(Shulamit x Robut 33-1)F2-B2-B1-B1-B1-B1-B1-B1	100	9
32.	(Argentine x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1	100	9
33.	Robut 33-1-22-11-B1-B1-B1-B1-B1-B1-B1	100	9

34.	Robut 33-1-50-1-B1-B1-B1-B1-B1-B1-B1	100	9
35.	Robut 33-1-24-16-B1-B1-B1-B1-B1-B1-B1	100	9
36.	Robut 33-1-10-17-B1-B1-B1-B1-B1-B1-B1	100	9
37.	Robut 33-1-1-1-B1-B1-B1-B1-B1-B1-B1	100	9
38.	(MGS 9 x Robut 33-1)F2-P1-B1-B1-N1B1-B1-B1-B1	100	9
39.	(Argentine x Chico)F2-P1-B1-B1-N1B1-B1-B1-B1-B1	100	9
40.	(DH 3-20 x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
41.	(MGS 7 x Robut 33-1)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
42.	(TMV 7 x Robut 33-1)F2-B2-B1-B1-B1-B2-B1-B1-B1	100	9
43.	(2-5 x Robut 33-1)F3-B1-B1-B1-B2-B1-B1-B1	100	9
44.	Robut 33-1-1-5-B1-B1-B1-B1-B1-B1-B1	100	9
45.	(Robut 33-1 x Ah 8254)F2-B1-B1-B1-B1-B1-B1-B1-B1	100	9
46.	(NC Ac 2462 x M 13)F2L-B1-B1-B1-B1-B1-B1-B1	100	9
47.	(MK 374 x Robut 33-1)F2-B1-B1-B1-B2-N1B1-B1-B1-B1	100	9
48.	F334A-D14-B1(NH)	100	9
49.	F334A-D14-B2(GP)	100	9
50.	H 3/4(E)	90	9
51.	H 3/5	90	9
52.	J 11	100	9
53.	Robut 33-1	100	9
54.	JL 24	100	9
55.	Mani Pintar	85	9
56.	RG 1	85	9
57.	Malimba	100	9
58.	SAC 58	85	9
59.	E 879/6/4	85	9
60.	Egret	85	9
61.	Spancross	100	9

62.	VAI (var)	90	9
63.	RRI/7	85	9
64.	RRI/31	85	9

EARLINESS -F9 GENERATION (L)

1.	(Ah 65x Robut 33-1)F2-B1-N1B1-B1-B2-B1-B1-B1	100	9
2.	(Ah 65 x Robut 33-1)F2-B1-N1B1-B1-B2-B1-B1-B2	100	9
3.	(Ah 6279 x Robut 33-1)EF2-B1-B1-B1-EB2-B1-B1-B3	100	9
4.	(Ah 6279 x Robut 33-1)EF2-B1-B1-B1-EB2-B1-B1-B5	100	9
5.	(Ah 8254 x Robut 33-1)LF2-N1B3-B1-B1-B2-B1-B1-B1	100	9
6.	(Ah 8254 x R0but 33-1)LF2-N1B3-B1-B1-B2-B1-B1-B3	100	9
7.	(Ah 8254 x R0but 33-1)LF2-N1B3-B1-B1-B2-B1-B1-B4	100	9
8.	(Ah 8254 x Robut 33-1)LF2-N1B3-B1-B1-B2-B1-B1-B5	100	9
9.	(Ah 8254 X Robut 33-1)EF2-B2-B1-B1-B1-B2-B1-B1-B1	100	9
10.	(Ah 8254 x Robut 33-1)EF2-B2-B1-B1-B2-B1-B1-B2	100	9
11.	(Comet x Robut 33-1)F2-N1B1-B1-B1-B2-B1-B1-B1	100	9
12.	(Florigiant x Robut 33-1)F2-B1-B1N1-B1-LB2-B1-B1-B2	100	9
13.	(JH 89 x Robut 33-1)F2-B1-B1N1-B2-B2-B2-B1-B1	100	9
14.	(JH 171 x Robut 33-1)F2-B1-B1-B1-B2-B2-B1-B1	100	9
15.	(JH 171 x Robut 33-1)F2-B1-B1-B1-B2-B2-B1-B2	100	9
16.	(JH 335 x Chico)F2-B1-B1-B1N1-B1-B4-B1-B1	100	9
17.	(MH 1 x Robut 33-1)F2L-B1N1-B1-B1-B2-B1-B1-B2	100	9
18.	(MH 1 x Robut 33-1)FL2-B1N1-B1-B1-B2-B1-B1-B3	100	9
19.	(MGS 8 x Robut 33-1)F2-B1-BLN1-B1-B2-B1-B1-B2	100	9
20.	(MGS 8 x Robut 33-1)F2-B2-B1N1-B1-B1-B1-B1-B2	100	9
21.	(MGS 9 x Robut 33-1)EF2-B2-B1N1-B1-B1-B1-B1-B1	100	9
22.	(MGS 9 x Chico)F2-P6-B1N1-B1-B1-B1-B1-B1	100	9

23.	(Manfredi x Chico)F2-B1-B1-B1-B2-B1-B1-B1(Tan)	100	9
24.	(Kadiri 71-1 x Robut 33-1)F2-B1-B1N1-B1-B1-B1-B1-B1	85	9
25.	(NC Ac 475 x Robut 33-1)F2E-B1-B1N1-B1-B2-B1-B1-B2	100	9
26.	(NC Ac 475 x Robut 33-1)F2E-B1-B1N1-B2-B2-B1-B1-B1	100	9
27.	(NC Ac 529 x Robut 33-1)F2E-B1-B1N1-B1-B2-B2-B1-B1-B2	100	9
28.	(NC Ac 1107 x Chico)F2-B1-B1-B1-B2-B1-B1-B2	100	9
29.	(NC Ac 2748 x Chico)F2-B2-B1N1-B1-B1-B1-B1-B1	100	9
30	(NC Ac 1107 x Robut 33-1)F2-B2-B1-B1N1-B1-B1-B1-B1	80	9
31.	(NC Ac 2748 x Robut 33-1)F2L-P2-B1-B1ND-B1-B1-B1-B1	100	9
32.	(NC Ac 2748 x Robut 33-1)F2L-P2-B1-B1N1-B1-B1-B1-B5	100	9
33.	(NC Ac 2748 x Robut 33-1)F2-B1-B1-B1-B2-B1-B1-B3	100	9
34.	(NC Ac 2748 x Robut 33-1)F2-B1-B1-B1-B2-B1-B1-B4	100	9
35.	(NC Ac 2654 x Robut 33-1)F2-B2-B1-B1-B2-B1-B1-B1	100	9
36.	(NC Ac 2654 x Robut 33-1)F2-B2-B1-B1-B2-B1-B1-B2	100	9
37.	(NC Ac 17113 x Robut 33-1)F2-B3-B1-B1-B1-B1-B1-B1	100	9
38.	(NC Ac 17113 x Robut 33-1)F2-B2-B1-B1-B2-B1-B1-B1	100	9
39.	(Robut 33-1 x Ah 8254)F2-B2-B1-B1-B1-B1-B1-B1	100	9
40.	(Robut 33-1 x Ah 8254)F2-B2-B1-B1-B1-B1-B1-B3	100	9
41.	(Robut 33-1 x Comet)F2-B1-B1-P1-B1-B1-B1-B1	100	9
42.	(Starr x Robut 33-1)F2E-B1N1-B1-B1-B2-B1-B1	100	9
43.	(TMV 10 x Chico)F2-B2-N1B1-B1-B1-B1-B1-B1	100	9
44.	(Manfredi x Chico)F2-P1-B1N1-B1-B1-B1-B1-B1	100	9
45.	(Robut 33-1 x Comet)F2-B2-B1-B1-B1-B1-B1-B1	100	9
46.	(Robut 33-1 x JH 171)F2-B1-B1-B1-B2-B1-B1-B1	100	9
47.	(Robut 33-1 x Shulamit)F2-B2-B1-B1-B2-B1-B2	100	9
48.	(Robut 33-1 x Spancross)F2-B2-B1-B1-B2-B1-B1-B1	100	9
49.	(Spancross x Robut 33-1)F2-B1-B1-B3-B2-B1-B1-B1	100	9
50.	(SM 5 x Robut 33-2)F2E-P2-B1N1-B1-B1-B1-B1-B1	100	9

51.	(Starr x Robut 33-1)F2-B2-B1-B1-B2-B1-B1-B1	100	9
52.	(Starr x Robut 33-1)F2-B2-B1-B1-B2-B4-B1-B1	100	9
53.	(Tifspan x Robut 33-1)F2E-B2-B1-B1-EB2-B2-B1-B1	100	9
54.	(TG 1 x Robut 33-1)P2-B1-B1-B1-B2-B1-B1-B1	100	9
55.	(TMV 7 x Robut 33-1)F2-B1-B1-B1-B1-B2-B1-B1	100	9
56.	(TMV 10 x Robut 33-1)F2-B1-B2-B1-B1-B2-B1-B1-B1	100	9
57.	(TMV 10 x Robut 33-1)F2-B2-B1-B1-B2-B1-B1-B4	100	9
58.	(TMV 10 x Chico)F2-B1-B1-P1-B1-B2-B1-B1	100	9
59.	(2-5 x Robut 33-1)F2-B1-B1-B3-B2-B1-B1-B1	100	9
60.	(2-5 x Robut 33-1)F2-B1-B1-B3-B2-B1-B1-B2	100	9
61.	(2-5 x Chico)EF2-B2-B1-EB2-B1-B1-B1	100	9
62.	(72-R x Robut 33-1)F2L-B1-B1-B2-B2-B1-B1-B1	100	9
63.	(72-R x Robut 33-1)EF2-B2-B1-B2-B2-B1-B1-B1	100	9
64.	(72-R xRobut 33-1)F2-B1-B1-N1B1-B1-B2-B1-B1	100	9
65.	(28-206 x Robut 33-1)LF2-B2-B1-P1-B1-B1-B1-B1	100	9
66.	(28-206 x Robut 33-1)LF2-B2-B1-P1-B1-B1-B1-B3	100	9
67.	(28-206 x Robut 33-1)LF2-B2-B1-P1-B1-B1-B1-B4	85	9
68.	(28-206 x Chico)F2L-B2-B1-B1-B1-B2-B1-B1	100	9
69.	(28-206 x Chico)F2L-B1-B1-N1B1-B1-B1-B1-B1	100	9
70.	(53-68 x Robut 33-1)F2-B1-B1-N1B1-B1-B1-B1-B1	80	9
71.	(X 14-4-B-19-B x Robut 33-1)F2L-B1-B1-B1-B2-B1-B1-B1	100	9
72.	(X 14-4-B-19-B x Robut 33-1)F2L-B1-B1-B1-B2-B1-B1-B2	100	9
73.	(X 40-X-X-3-B x Robut 33-1)F2-B1-B1-B1-B2-B1-B1-B1	100	9
74.	(X 52-X-X-3-B x Robut 33-1)F2-B1-B1-N1B1-B1-B1-B1-B1	100	9
75.	(X 52-X-X-3-B x Robut 33-1)F2-B1-B1-N1B1-B1-B1-B1-B2	100	9
76.	(X 52-X-X-3-B x Chico)F2-B1-B1-B1-B2-B1-B1-B1	100	9
77.	(X 52-X-X-3-B x Chico)F2-B1-B1-B1-B2-B1-B1-B2	100	9
78.	(Robut 33-1 x NC Ac 316)F2-P1-B1-N1B1-B1-B1-B1-B1	100	9

79.	(Argentine x Robut 33-1)F2-B2-B1-N1B1-B1-B1-B1-B1	100	9

EARLINESS -F10 GENERATION (L)

1.	(Argentine x Robut 33-1)F2-B2-B1-b1-B2-B1-B1	100	9
2.	(Argentine x Chico)F2-B2-B1-B1-B1-B1-B1-B1-B1	100	9
3.	(Ah 65 x Chico)F2-B2-B1N1-B1-B2-B2-B1-B1-B1	100	9
4.	(Ah 65 x Chico)F2-B2-B1N1-B1-B2-B2-B1-B1-B2	100	9
5.	(Ah 65 x Chico)F2-B2-B1N1-B1-B2-B1-B1-B1-B2-B1	100	9
6.	(Ah 2105 x Chico)F2-B2-B1-B1-B1-B2-B1-B1-B1	100	9
7.	(Ah 2105 x Chico)F2-B2-B1-B1-B1-B2-B1-B2-B1	100	9
8.	(Ah 2105 x Chico)F2-B2-B1-B1-B1-B2-B1-B2-B2	100	9
9.	(Ah 2105 x Chico)F2-B2-B1-B1-B1-B2-B1-B2-B3	100	9
10.	(DH 3-20 x Robut 33-1)F2-P1-B1-B1-B1-B2-B1-B1-B1	100	9
11.	(DH 3-20 x Robut 33-1)F2-P1-B1-B1-B1-B2-B1-B1-B3	100	9
12.	(DH 3-20 x Robut 33-1)F2-P1-B1-B1-B1-B2-B1-B1-B2	100	9
13.	(Florigiant x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B3	100	9
14.	(Florigiant x Chico)F2-B1-B1-B1-B2-B2-B1-B1-B1	85	9
15.	(Florigiant x Chico)F2-B1-B1-B1-B2-B2-B1-B1-B2	100	9
16.	(Florigiant x Chico)F2-P3-B1-B1-B1-B1-B1-B1-B1	100	9
17.	(Florigiant x Chico)F2-P1-B1-B1-EB1-EB2-B1-B1-B1	100	9
18.	(Florigiant x Chico)F2-P1-B1-B1-B1-EB2-B1-B1-B1	100	9
19.	(Goldin 1 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
20.	(Goldin 1 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B2	85	9
21.	(Goldin 1 x Robut 33-1)EF2-P2-B1-B1-B1-EB2-B1-B1-B1	100	9
22.	(Goldin 1 x Robut 33-1)EF2-P2-B1-B1-B1-EB2-B2-B1-B1	100	9

23.	(GA 207-3 x Robut 33-1)F2-B1-B1-B1-B1-B2-B2-B1-B1	100	9
24.	(GA 207-3 x Robut 33-1)F2-B1-B1-B1-B1-B2-B2-B1-B2	100	9
25.	(JH 89 x Robut 33-1)F2-P3-B1-B1-B1-B2-B1-B1-B1	100	9
26.	(JH 89 x Robut 33-1)F2-P3-B1-B1-B1-B2-B1-B1-B2	100	9
27.	(JH 89 x Robut 33-1)F2-P3-B1-B1-B1-B2-B2-B1-B1	100	9
28.	(JH 171 x Robut 33-1)F2-B1-B1-B1-B1-B2-B1-B1-B1	100	9
29.	(JH 171 x R0but 33-1)F2-B1-B1-B1-B1-B2-B2-B1-B1	100	9
30.	(JH 171 x Robut 33-1)F2-B1-B1-B1-B1-B2-B1-B2	100	9
31.	(JH 171 x Robut 33-1)F2-B1-B1-B1-B1-B1-B1-B1	100	9
32.	(JH 171 x Chico)F2-B2-B2-B1-B1-B1-B1-B1-B1	100	9
33.	(JH 335 x Robut 33-1)F2-P3-B1-B1-B1-B2-B1-B1-B1	100	9
34.	(JH 335 x Chico)F2-B1-B1-B1-B1-B2-B2-B1-B1	100	9
35.	(Kadiri 71-1 x Robut 33-1)F2-B2-B1-B1-B1-B2-B1-B1-B1	100	9
36.	(Kadiri 71-1 x Robut 33-1)F2-B2-B1-B1-B1-B2-B1-B1-B1	100	9
37.	(Kadiri 71-1 x Robut 33-1)F2-B2-B1-B1-B1-B2-B1-B1-B3	100	9
38.	(Kadiri 71-1 x Robut 33-1)F2-P2-B1-B1-B2-B2-B1-B1-B1	100	9
39.	(Kadiri 71-1 x Chico)F2-B1-B1-B1-B1-B2-B2-B1-B1	85	9
4o.	(Manfredi x Chico)F2-P3-B1-B1-B1-B1-B1-B1-B1	100	9
41.	(Manfredi x Chico)F2-P3-B1-B1-B1-B1-B1-B1-B2	100	9
42.	(M 13 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
43.	(M 13 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B3	100	9
44.	(M 13 x Robut 33-1)LF2-P4-B1-B1-B1-B2-B1-B1-B1	100	9
45.	(M 13 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
46.	(MGS 9 x Chico)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
47.	(NC Ac 1107 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
48.	(NC Ac 1107 x Chico)F2-P2-B1-B1-B1-B1-B1-B1-B1	100	9
49.	(NC Ac 1107 x Chico)F2-P2-B1-B1-B1-B1-B1-B1-B3	100	9
50.	(NC Ac 2748 x Robut 33-1)F2-P6-B1-B1-B1-B1-B2-B1-B1	100	9

51.	(NC ac 2748 x Robut 33-1)LF2-B1-B1-B1-B1-B2-B1-B1-B2	80	9
52.	(NC Ac 2748 x Robut 33-1)LF2-B1-B1-B1-B1-B2-B2-B1-B1	100	9
53.	(Robut 33-1 x M 13)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
54.	(Robut 33-1 x NC Ac 310)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
55.	(Robut 33-1 x NC Ac 316)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
56.	(Robut 33-1 x NC Ac 2821)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
57.	(Robut 33-1 x NC Ac 2821)F2-P1-B1-B1-B1-B1-B1-B1-B2	100	9
58.	(Shulamith x Chico)EF2-P1-B1-B1-B2-B2-B1-B1-B1	100	9
59.	(Shulamith x Chico)F2-P4-B1-B1-B1-B1-B2-B1-B1	100	9
60	(SM 5 x Robut 33-1)F2-P3-B1-B1-B1-B1-B1-B1-B2	100	9
61.	(SM 5 x Robut 33-1)F2-P3-B1-B1-B1-B1-B1-B1-B3	100	9
62.	(SM 5 x Robut 33-1)F2-P5-B1-B1-EB1-B2-B1-B1-B1	100	9
63.	(SM 5 x Robut 33-1)F2-P5-B1-B1-EB1-B2-B1-B1-B2	100	9
64.	(TMV 4 x Chico)F2-P2-B1-B1-B1-EB2-B1-B1-B1	100	9
65.	(TMV 4 x Chico)F2-P2-B1-B1-B1-EB2-B1-B1-B2	100	9
66.	(TMV 4 x Chico)F2-P1-B1-B1-EB1-LB2-B2-B1-B1	100	9
67.	(TMV 7 x Robut 33-1)F2-P5-B1-B1-EB1-B2-B1-B1-B1	100	9
68.	(TMV 10 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B1	100	9
69.	(TMV 10 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B3(Red)	100	9
70.	(TMV 10 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B4	100	9
71.	(TMV 10 x Robut 33-2)F2-P1-B1-B1-B1-B1-B1-B1-B3(TAN)	100	9
72.	(TMV 10 x Chico)F2-P1-B1-B1-EB1-B2-B2-B1-B1	100	9
73.	(2-5 x Robut 33-1)F2-P6-B1-B1-B1-B1-B1-B1-B1	100	9
74.	(2-5 x Robut 33-1)F2-P9-B1-B1-B1-B1-B1-B1-B2	100	9
75.	(2-5 x Robut 33-1)F2-P11-B1-B1-B1-B1-B1-B1-B1	100	9
76.	(2-5 x Robut 33-1)F2-B2-B1-B1-B1-B1-B1-B1-B1	100	9
77.	(2-5 x Robut 33-1)F2-P13-B1-B1-B1-B2-B1-B1-B1	100	9
78.	(2-5 x Robut 33-1)F2-P1-B1-B1-B1-B2-B1-B1-B1	100	9

79.	(2-5 x Robut 33-1)F2-P1-B1-B1-B1-B2-B2-B1-B1	100	9
80.	(53-68 x Robut 33-1)F2-B2-B1-B1-B1-B1-B1-B1-B1	100	9
81.	(53-68 x Robut 33-1)F2-B2-B1-B1-B1-B1-B1-B1-B2	100	9
82.	(53-68 x Robut 33-1)F2-B2-B1-B1-B1-B1-B1-B1-B3	100	9
83.	(53-68 x Chico)F2-B2-B1-B1-B1-B2-B4-B1-B1	100	9
84.	(28-206 x Robut 33-1)F2-P1-B1-B1-B1-B1-B1-B1-B2	100	9
85.	(28-206 x Chico)F2-B1-B1-B1-B1-B2-B1-B1-B2	100	9
86.	(X 40-X-X-3-B x Robut 33-1)F2-B2-B1-B1-B1-B2-B2-B1-B1	100	9
87.	(X 40-X-X-3-B x Chico)F2-B2-B1-B1-B1-B2-B1-B1-B1	100	9
88.	(X 40-X-X-3-B x Chico)F2-B2-B1-B1-B1-B2-B1-B1-B2	100	9
89.	(X 40-X-X-3-B x Robut 33-1)F2-B2-B1-B1-B2-B2-B1-B1-B1	80	9

YIELD TRIAL = EARLINESS

1.	(Ah 330 x 91176)EF2-B1-B1-B1	100	9
2.	(75-24 x Chico)F2-B1-EB2-B2-B1-B1	100	9
3.	(TMV 7 x Chico)F2-P8-B1-B1-EB1-B2-B1-B1-B1	100	9
4.	(72-R x Chico)F2-P1-B1-N1B1-B1-B1-B1-B1	100	9
5.	(Dh 3-20 x Chico)F2-B1-B1-B1-EB1-B2E-B1-B1-B1	100	9
6.	(Argentine x Chico)F2E-B2-B1-B1-EB1-B2E-B1-B1-B1	100	9
7.	(JH 89 x Chico)F2-B1-B1-N1B1-B2-B1-B1-B1	100	9
8.	(Manfredi x Chico)F2-B3-B1-B1-B1-B1-B1	100	9
9.	(TMV 7 x Chico)F2-P5-B1-B1-B2-B1-B1	100	9
10.	(75-24 x Chico)F2-EB2-B2-B1-B2-B1	100	9
11.	(75-24 x Chico)F2-EB2-B1-B1-B4-B1	100	9
12.	(NC Ac 2748 x Chico)F2-P8-B1-B1-EB1-B2-B1-B1-B1	100	9
13.	(NC Ac 2748 x Chico)F2-P1-B1-B1-B1-B2-B1-B1-B1	100	9
14.	(NC Ac 2748 x Chico)F2-B4-B1-B1-B1-B2-B1-B1-B1	100	9

15.	91176	100	9
16.	Chico	100	9
17.	JL 24	100	9
18.	Malimba	100	9
19	Spancross	100	9

APPENDIX III

REACTION OF 40 GROUNDNUT GENOTYPES TO CERCOSPORA ARACHIDICOLA

1.PERCENTAGE DEFOLIATION

S.No.	Genotype	Percent defoliation at :				
		60days	75days	90days	105days	120days
1.	Robut 33-1	25.92	57.42	80.48	100.00	100.00
2.	Malimba	23.26	61.76	79.76	100.00	100.00
3.	Chalimbana	27.04	55.90	75.42	87.96	87.86
4.	TMV 2	18.20	57.82	86.84	100.00	100.00
5.	C.No.45-23	4.86	36.72	51.16	65.98	87.62
6.	RMP 91	24.20	63.84	77.36	92.16	94.18
7.	RMP 12	16.12	58.94	74.72	89.38	96.28
8.	RMP 89	19.58	63.90	77.62	90.38	96.16
9.	NC Ac 17142	17.66	52.22	63.62	74.96	90.42
10.	PI 162859	6.16	47.22	61.58	78.08	90.98
11.	PI 215696	21.72	49.36	59.60	65.64	85.02
12.	PI 275750	20.98	44.80	63.22	73.26	89.48
13.	PI 259747	24.76	46.96	61.98	75.04	87.94
14.	PI 298115	32.45	60.86	86.14	100.00	95.64
15.	PI 314817	18.94	54.22	82.30	100.00	100.00
16.	PI 341879	19.10	44.28	70.18	85.86	89.56
17.	PI 350680	16.92	40.82	70.46	81.88	87.48
18.	PI 381622	23.20	44.44	63.76	83.08	95.70
19.	NC Ac 17135	8.44	37.52	51.02	68.46	86.88
20.	NC Ac 17133-RF	8.18	32.98	44.54	55.68	83.06
21.	NC Ac 17132	12.72	32.22	45.68	56.34	84.56
22.	NC Ac 17129	9.14	32.92	47.06	64.62	88.20
23.	NC Ac 17090	10.28	44.64	76.22	100.00	97.40
24.	NC 3033	18.34	55.14	83.06	100.00	87.84
25.	Krap.St.16	0.00	28.96	50.70	84.38	95.04
26.	PI 414331	3.52	34.88	62.62	89.40	96.32
27.	PI 414332	18.08	56.34	76.96	100.00	100.00
28.	PI 407454	1.02	40.60	63.30	86.24	96.60
29.	PI 405132	8.64	35.78	66.70	82.94	91.58
30.	PI 393646	1.06	34.90	57.22	77.46	100.00
31.	PI 393643	13.42	36.58	59.96	87.72	100.00
32.	PI 393641	1.50	38.58	53.42	67.24	93.28
33.	PI 270806	24.66	46.06	64.14	79.88	87.40
34.	PI 393531	2.44	37.16	56.54	70.94	90.80
35.	PI 393527-B	11.06	44.18	62.86	80.12	100.00
36.	PI 393526	13.32	49.00	66.92	80.28	88.72
37.	PI 393517	3.78	43.60	78.06	100.00	100.00
38.	PI 393516	5.36	29.82	36.20	44.76	77.48
39.	PI 390593	11.62	44.82	61.64	72.46	87.44
40.	EC 76446(292)	16.88	45.00	62.68	80.78	90.18
	S.E.OF MEAN	2.79	3.07	2.62	2.00	1.59
	CV (%)	43.48	14.95	8.90	5.44	5.85

S.No.	Genotype	Percent leaf area damag at :				
		60days	75days	90days	105days	120days
1.	Robut 33-1	7.00	17.02	15.90	0.00	0.00
2.	Malimba	13.32	24.60	16.30	0.00	0.00
3.	Chalimbana	3.98	12.40	14.46	12.26	23.18
4.	TMV 2	5.78	21.40	16.62	0.00	0.00
5.	C.No.45-23	3.86	15.88	19.12	21.12	12.38
6.	RMP 91	1.90	11.10	12.20	3.90	6.50
7.	RMP 12	1.22	12.18	12.88	7.12	2.58
8.	RMP 89	1.20	9.20	11.58	7.84	6.04
9.	NC Ac 17142	8.20	16.54	15.82	10.28	5.62
10.	PI 162859	3.18	11.12	12.48	11.10	8.92
11.	PI 215696	4.38	9.64	13.42	11.60	9.72
12.	PI 275750	7.54	14.16	13.72	16.96	7.16
13.	PI 259747	6.66	13.70	13.16	17.06	7.10
14.	PI 298115	7.58	18.34	16.42	0.00	6.52
15.	PI 314817	9.82	20.16	20.08	0.00	0.00
16.	PI 341879	5.34	15.36	18.96	19.70	18.40
17.	PI 350680	5.60	12.30	10.72	26.68	17.24
18.	PI 381622	2.96	10.24	15.54	20.52	7.60
19.	NC Ac 17135	1.06	9.80	20.94	19.90	27.28
20.	NC Ac 17133-RF	0.94	8.66	15.98	17.34	28.66
21.	NC Ac 17132	1.62	11.18	13.36	13.46	18.74
22.	NC Ac 17129	3.54	10.66	15.32	15.34	14.64
23.	NC Ac 17090	4.32	19.70	24.10	0.00	2.06
24.	NC 3033	2.34	10.56	10.20	0.00	9.02
25.	Krap.St.16	1.32	8.94	14.74	18.76	11.42
26.	PI 414331	0.74	10.84	16.24	20.12	6.68
27.	PI 414332	3.04	14.64	15.72	0.00	0.00
28.	PI 407454	2.52	16.14	17.74	29.02	6.90
29.	PI 405132	0.74	12.82	16.20	26.88	9.66
30.	PI 393646	2.14	15.10	16.24	19.16	0.00
31.	PI 9393643	3.32	13.68	14.72	14.34	0.00
32.	PI 393641	2.54	18.78	16.56	13.54	5.88
33.	PI 270806	4.52	12.16	13.22	12.96	8.80
34.	PI 393531	2.56	12.46	18.80	22.88	12.46
35.	PI 393527-B	1.76	8.10	11.68	15.72	0.00
36.	PI 393526	4.50	13.40	15.80	18.54	11.76
37.	PI 393517	4.44	19.16	13.70	0.00	0.00
38.	PI 393516	3.50	10.26	12.66	12.80	18.64
39.	PI 390593	2.50	11.74	12.32	13.50	19.64
40.	EC 76446(292)	3.94	12.34	35.28	34.68	29.28
	S.E.OF MEAN	0.93	2.10	1.55	1.50	2.79
	CV (%)	50.86	34.12	21.88	36.13	48.65

3.PERCENTAGE RETAINED GREEN LEAF

S.No.	Genotype	Percent green leaf retained at :				
		60days	75days	90days	105days	120days
1.	ROBUT 33-1	69.02	35.15	16.55	0.00	0.00
2.	Malimba	66.66	28.81	17.03	0.00	0.00
3.	Chalimbana	70.11	38,65	20.91	10.67	9.39
4.	TMV 2	77.08	33.25	10.92	0.00	0.00
5.	C.NO.45-23	91.45	53.28	39.48	26.85	10.83
6.	RMP 91	74.35	32.23	19.86	7.46	5.34
7.	RMP 12	82.86	36.19	22.00	9.79	3.57
8.	RMP 89	79.42	32.61	19.72	8.87	3.57
9.	NC AC 17142	75.57	39.79	30.74	22.40	9.04
10.	PI 162859	90.88	46.82	33.66	19.42	8.19
11.	PI 215696	74.91	45.71	34.98	30.48	13.43
12.	PI 275750	73.16	47.66	31.78	22.20	9.80
13.	PI 259747	70.30	45.59	32.97	20.68	11.10
14.	PI 298115	62.87	32.22	11.28	0.00	3.84
15.	PI 314817	73.26	36.66	14.12	0.00	0.00
16.	PI 341879	76.59	47.15	24.11	11.08	8.44
17.	PI 350680	78.42	51.69	26.36	13.42	10.29
18.	PI 381622	74.52	49.81	30.47	13.35	3.90
19.	NC Ac 17135	90.58	56.40	38.69	25.42	9.53
20.	NC Ac 17133-RF	90.95	61.14	46.56	36.55	11.91
21.	NC Ac 17132	85.89	60.23	47.03	37.73	12.56
22.	NC Ac 17129	87.66	59.88	44.77	29.90	10.14
23.	NC Ac 17090	58.78	44.50	17.84	0.00	2.47
24.	NC 3033	79.78	40.13	15.20	0.00	11.03
25.	Krap.St.16	98.68	64.68	41.99	12.72	4.36
26.	PI 414331	95.76	57.93	30.97	8.38	3.36
27.	PI 414332	79.48	37.53	19.46	0.00	0.00
28.	PI 407454	96.48	49.60	30.21	9.71	3.01
29.	PI 405132	90.68	56.00	27.94	12.49	7.62
30.	PI 393646	96.82	55.14	35.81	18.26	0.00
31.	PI 393643	83.72	54.90	34.25	10.60	0.00
32.	PI 393641	96.00	50.05	38.94	28.31	6.26
33.	PI 270806	71.93	47.44	31.05	17.28	11.59
34.	PI 393531	95.06	55.04	35.10	21.45	8.05
35.	PI 393527-B	87.39	51.20	32.78	16.68	0.00
36.	PI 393526	82.88	44.30	27.87	16.07	9.89
37.	PI 393517	91.90	45.55	18.92	0.00	0.00
38.	PI 393516	91.38	62.97	55.71	48.14	18.38
39.	PI 390593	86.10	48.73	33.63	23.88	10.16
40.	EC 76446(292)	79.87	48.05	24.16	12.61	6.88
	S.E.OF MEAN	2.90	2.84	2.23	1.72	1.37
	CV (%)	7.87	13.59	17.36	26.15	48.66

APPENDIX IV

SCREENING OF GROUNDNUT GERMPLASM FOR RESISTANCE TO ROSETTE AT CHITEDZE AGRICULTURAL RESEARCH STATION, LILONGWE, MALAWI - 1982/83.

Row No.	Genotype	Disease Reaction		
		Rosette incidence (%)	Early leafspot	
			Defoliation (%)	Score
1	Makulu Red	100	75	9
2	Georgia Bunch 207-3-4-24	67	85	9
3	33227	13	90	9
4	U/A 26B 736	14	100	9
5	RRI/12	0	95	9
6	M 28	14	90	9
7	Mani Pintar	100	92	9
8	Starr	80	100	9
9	AM 1	33	85	9
10	MJ 374(?)	39	82	9
11	M 11	25	90	9
12	Chimbwila L17	21	85	9
13	U/A 38 Atubei	-	100	9

14	AC 32	39	78	9
15	Improved Spanish	41	100	9
16	Makulu Red	63	90	9
	Mugoya selection			
17	C 6	56	75	9
18	M 4	58	85	9
19	C 13	75	70	9
20	Rumphi Blade	67	100	9
	Skinned			
21	C 5	55	85	9
22	5828	100	100	9
23	M 17	56	88	9
24	Rhodesian	41	90	9
	selection 2			
25	RRI/4	0	90	9
26	Bambay 48-37	0	90	9
27	AM 3	14	100	9
28	Hong-Kong	19	92	9
29	RRI/1	0	80	9
30	489	0	82	9
31	RMP 49/2/1	0	85	9
32	N/A 37 Virginia	43	93	9
	Bunch			
33	U/A 18B 725	100	100	9
34	RMP 11	9	80	9
35	M 10	46	85	9
36	M 13	64	78	9
37	Japanese Bunch	100	100	9

38	M 19	84	77	9
39	C 9	68	85	9
40	Sinfala local	100	80	9
41	M 18	97	80	9
42	Bambay 48-35-2	0	85	9
43	A 1375	100	92	9
44	C 7	52	70	9
45	Mwitunde Nachingwela	33	80	9
46	M 9	35	80	9
47	Matevere	35	90	9
48	AM 22 Variety78	27	90	9
49	A 319	15	90	9
50	S/A 1A B4 Arbon	34	85	9
51	PR-64B	6	80	9
52	124,681	13	95	9
53	Chimbwila L 11	27	90	9
54	B222/RR/1/1/B1/1	0	85	9
55	M 20	24	90	9
56	M 16	100	70	9
57	C 10	53	70	9
58	Schwartz 21	100	100	9
59	M 12	100	80	9
60	Valencia White	100	80	9
61	5834	100	100	9
62	Bambay 48-36	0	80	9
63	Rhodesian	22	85	9

64	43-9-90	29	80	9
65	H.G.I	45	85	9
66	C 17	9	85	9
67	M 8	14	80	9
68	DL/60/1521 (44G346)	61	75	9
69	M 5	6	80	9
70	M 14	6	85	9
71	Bambay 487Exs.R	10	80	9
72	C 8	17	90	9
73	Makulu Brown	18	95	9
74	5840	29	95	9
75	S/A 7 Zonde	71	100	9
76	Kupwato	47	85	9
77	Bambay 48-15A	41	100	9
78	M 15	29	80	9
79	Kadjani 61	13	100	9
80	Offtype No.21 (4/A 22)	19	85	9
81	Early Runner Sabi selection	35	90	
82	U/A 35-5-723	53	80	9
83	M 2	67	80	9
84	M 7	61	80	9
85	American	47	85	9
86	Buyaya	100	75	9
87	Kading Batavia	64	100	9
88	M 3	100	85	9

89	DL/60/1520 (DZ7B) Shell Chop	100		
90	Ex Nachingwela	100	-	9
91	A 1373	0	90	9
92	Kagwa Red	100	100	9
93	N/A 1 Bambay	100	100	9
94	Mahogany	100	100	9
95	C 18	100	85	9
96	HG 1	100	90	9
97	5843	94	85	9
98	M 6	87	85	9
99	809	86	100	9
100	Chalimbana	93	85	9
101	S/A 4 Jur	100	100	9
102	52-14	45	85	9
103	U/A 335721	38	100	9
104	TMV 3	82	90	9
105	PR 65B	6	85	9
106	U/A 36S 726	100	-	9
107	AM 5	100	-	9
108	NH 73/74/2(3)	100	-	9
109	T/A 1 Kulinde	100	100	9
110	PI 337404	100	100	9
111	A 1366	0	80	9
112	Bambay 48-34	41	80	9
113	S/A3 Beledi Bunch	18	100	9
114	Georgia Bunch	20	85	9
115	A 1374	26	85	9

116	Gunsons	60	80	9
117	149-654	100	100	9
118	S/A 6 K.C.A	16	100	9
119	U/A 21B 729	13	100	9
120	Virginia Bunch Large	34	80	9
121	U/A 39 Kapwato	11	100	9
122	U/A 7B 353	5	100	9
123	Chambwila L16	44	85	9
124	U/A 19B 727	44	100	9
125	Wina Bunch	45	85	9
126	Early Runner	65	85	9
127	U/A 345722	14	100	9
128	Chalimbana (1)	24	80	9
129	A7 Gandajika	19	100	9
130	RMP 49/3	0	85	9
131	AM 2	46	90	9
132	A 1368	0	85	9
133	A/A3 Natal common	-	100	9
134	Early Bunch	90	90	9
135	S2-11	19	80	9
136	A65 Gandajika	46	85	9
137	C 19	56	85	9
138	Mwitemde Asiriya	16	90	9
139	U/A 10B 721	19	100	9
140	Gambia spreading	68	90	9
141	U/A 31 S718	62	90	9

142	Nsaru Local	53	85	9
143	Common White	17	100	9
144	U/A 28S 178	54	100	9
145	N/A Virginia Bunch	55	85	9
146	U/A 29S 185	-	100	9
147	SP 8	86	90	9
148	NH 73/74/1	100	90	9
149	M 14	100	85	9
150	NH 73/74/4	100	95	9
151	RRI/22	0	85	9
152	MB 661	45	95	9
153	SA/A744-9-346	32	80	9
154	U/A 37S 731	35	85	9
155	U/A Teno Bunch	37	85	9
156	Kalisele Local	22	85	9
157	AP 205 Spanish	6	100	9
158	DL/60/1522(P4080)	14	85	9
159	Holand station jumbo	8	100	9
160	Malchanya Local	100	85	9
161	Malwa Runner	100	80	9
162	RRI/25	0	80	9
163	Virginia Bunch 46-2	100	80	9
164	U/A 17B 724	28	100	9
165	U/A 20B 728	38	100	9
166	Variety 68	71	85	9
167	SA/Al(Ah-32)	-	100	9

168	PR 43B	0	80	9
169	RG 1/3	0	85	9
170	PR 46B	0	80	9
171	SP 10	36	90	9
172	Spanish 22	41	100	9
173	PR 49B	0	80	9
174	Spantex	56	100	9
175	PR 59B	0	80	9
176	MB 664	100	95	9
177	RMP 49/5	0	90	9
178	Spanish Bunch ARS	100	100	9
179	DL/60/1524(436-68)	100	-	9
180	Bambay 48-21	0	90	9
181	U/A2BB2	100	100	9
182	RRI/6	0	85	9
183	Mango Nzanya	100	85	9
184	52-725	48	85	9
185	Tifspan	56	100	9
186	PR 30B	0	90	9
187	RMP 16	39	85	9
188	RRI/16	0	85	9
189	RRI/31	0	85	9
190	RMP 49	0	90	9
191	M 4	14	90	9
192	NH 73/74/2	15	75	9
193	RRI/20	32	85	9
194	SP 5	13	90	9
195	RRI/4	0	90	9

196	RG1/48	0	90	9
197	Makulu Brown	42	90	9
198	E879/1/2	58	90	9
199	RMP 40	0	80	9
200	Tunduru	100	95	9
201	SP 7	100	85	9
202	S/A2 Barbanton	88	100	9
203	U/A 24B733	100	100	9
204	RMP 49/2/2	0	85	9
205	488	3	85	9
206	SP 6	91	85	9
207	A8 Gundajika	100	90	9
208	C 14	100	85	9
209	Castle carry	88	80	9
210	AC 321	100	85	9
211	U/A 5B237	16	100	9
212	SA/A8 47-9-114	100	90	9
213	Argentina White	100	-	9
214	RRI/23	7	70	9
215	U/A40 Mbale Bunch	100	-	9
216	DL/60/1523 (50b-30A)	100		
217	RRI/5	0	85	9
218	C 1	50	80	9
219	Spanish 18-59	100	85	9
220	U/A27B737	93	90	9
221	RRI/14	0	80	9
222	C 2	100	80	9

223	B222/RR/5/6/1	0	85	9
224	RRI/29	0	80	9
225	U/A11B703	51	100	9
226	C 4	38	85	9
227	Chalimbana(2)	52	85	9
228	S/A 5 Kalinde	19	100	9
229	SAC 113	79	100	9
230	MB 6616	90	85	9
231	PR 46B	0	80	9
232	SA/A5 42-9-105	100	100	9
233	RG/18	0	90	9
234	U/A1 BS1	0	85	9
235	Kanyama	95	85	9
236	U/A12B704	100	100	9
237	Argentina 121070	19	100	9
238	RRI/8	0	85	9
239	SA/A4 Virginia	77	95	9
240	I.A Red Bassaga	48	100	9
241	SA/A2 Masambika	46	95	9
242	18-38	44	100	9
243	SAC 77	37	100	9
244	Bambay48-44	61	85	9
245	Muloya Tunduru	50	85	9
246	T/A7 Spanish	100	85	9
247	SP 9	65	90	9
248	RRI/21	0	90	9
249	T/A Kunyama	100	85	9
250	Holland Station	100	85	9

	Bunch			
251	B222/RR/6/1/B1/1	0	85	9
252	Florida 416	100	85	9
253	PR 43B	0	85	9
254	SAC 63	100	100	9
255	PR 47B	3	80	9
256	RMP 49/6	0	90	9
257	RG 11	0	90	9
258	RRI/18	0	85	9
259	K 38	100	85	9
260	U/A 13B 713	100	100	9
261	B224/RR/5/B1/SPS1	0	85	9
262	Dixie Runner	100	-	9
263	PI 337394	100	-	9
264	T/A 4 Kabamba	100	-	9
265	PR29/B	0	90	9
266	SP 3	100	85	9
267	Rhodesian	100	100	9
	Selection 1			
268	U/A 15B717	6	85	9
269	N/A Muritunde	100	85	9
270	Nhambaguarea	100	100	9
271	C 20	100	85	9
272	K.C.A.S/A6	36	100	9
273	C 3	59	85	9
274	C 11	53	85	9

APPENDIX V

SCREENING OF INTERSPECIFIC HYBRID DERIVATIVES FOR RESISTANCE TO ROSETTE VIRUS DISEASE AT THE CHITEDZE AGRICULTURAL RESEARCH STATION, LILONGWE, MALAWI, DURING THE 1982-83 SEASON.

Line No.	Genotype	Rosette incidence (%)
1	703	100
2	705	100
3	707	100
4	708	100
5	709	100
6	710	100
7	711	100
8	712	100
9	713	100
10	716	100
11	717	100
12	718	100
13	720	100
14	722	100
15	723	100
16	724	100
17	725	100

18	732	100
19	735	100
20	736	100
21	740	100
22	743	100
23	745	100
24	747	100
25	748	100
26	750	100
27	757	100
28	761	100
29	763	100
30	773	100
31	777	86
32	778	83
33	779	100
34	780	100
35	781	85
36	782	100
37	783	100
38	784	100
39	786	100
40	787	100
41	790	100
42	791	100
43	792	100
44	793	100
45	796	100

46	797	100
47	798	100
48	799	100
49	801	95
50	804	100
51	803	100
52	805	100
53	807	100
54	810	100
55	811	100
56	812	100
57	813	100
58	814	100
59	815	100
60	817	100
61	819	100
62	821	100
63	822	100
64	823	100
65	824	100
66	825	100
67	827	95
68	830	100
69	832	95
70	834	100
71	835	100
72	836	100
73	837	100

74	838/1	100
75	838/2	100
76	840	100
77	842	100
78	843	100
79	845	100
80	846	100
81	848	100
82	850	100
83	851	100
84	853	100
85	854	100
86	855	100
87	856	100
88	859	100
89	865	100
90	867	100
91	868	100
92	869	98
93	870	100
94	871	100
95	874	100
96	875	100
97	877	100
98	879	100
99	880	100
100	881	100
101	882	100

102	883	100
103	886	100
104	887	100
105	888	100
106	889	100
107	890	100
108	893	100
109	894	100
110	895	100
111	896/1	100
112	896/2	100
113	897	100
114	898	100
115	899	100
116	902	100
117	903	100
118	904	100
119	906	100
120	907	100
121	908	100
122	918	100
123	919	100
124	920	100
125	927	100
126	941	100
127	942	100
128	943	100
129	945	100

130	946	100
131	948-1	100
132	949	100
133	950	100
134	951	100
135	952/1	100
136	953-1	100
137	954	100
138	955	100
139	956	100
140	957	100
141	958	100
142	962	100
143	965	100
144	988	100
145	1000	100
146	1002	100
147	1004	100
148	1008	100
149	1009-1	98
150	1018-10	100
151	1019-15	100
152	1021/1	100
153	1021/2	100
154	1022	92
155	1023-18	100
156	1025-17	100
157	2002	100

158	2027	100
159	2028	100
160	2049	100
161	2055	100
162	2058	100
163	2059	100
164	2062/1	100
165	2074	100
166	2078	100
167	2094	100
168	2098	100
169	2104	100
170	2117	100
171	2118/1	100
172	2148	100
173	2133	100
174	2160	100
175	2164	100
176	2190	100
177	2192	100
178	2197	100
179	2217/1	100
180	2224	100
181	2226	100
182	2233	100
183	2234	100
184	2235	100
185	2245	100

186	2256	100
187	2257	100
188	2273	100
189	2284	100
190	2297/1	100
191	2301	100
192	2304/1	100
193	2308	100
194	2309	100
195	2312/1	100
196	2316	100
197	2323	100
198	2325	100
199	2328	100
200	2343	100
201	2331	100
202	2349	100
203	2359	100
204	2372	100
205	2373	100
206	2373/3	100
207	2373/4	100
208	2378	100
209	2380	100
210	2384/2	100
211	2386	100
212	2387	100
213	2388	100

214	2392	100
215	2395	100
216	2396	100
217	2397	100
218	2403	100
219	2403/3	100
220	2404	100
221	2404/3	100
222	2404/4	100
223	2408	100
224	2408/1	100
225	2410	100
226	2412	100
227	2414	100
228	2415	100
229	2416	100
230	2418	100
231	2419	100
232	2421	100
233	2426	100
234	2429	100
235	2429/1	100
236	2430	100
237	2435	100
238	2440/1	100
239	2445	100
240	2461	100
241	2470/1	100

242	2476	100
243	2477	100
244	2477/3	100
245	2480	100
246	2483	100
247	2507	100
248	2508	100
249	2511	100
250	2512	100
251	2514	100
252	2514/1	100
253	1070	100
254	1123	100
255	1126	100
256	1128	78
257	1132	75
258	1133	58
259	1141	65
260	1143	100
261	1144	100
262	1151	100
263	1154	65
264	1158	100
265	1162	100
266	1163	100
267	1164	100
268	1165	100
269	1174	100

270	1175	100
271	1177	65
272	1183	100
273	1184	100
274	1185	100
275	1189	50
276	1193	100
277	1194	100
278	1197	100
279	1200	100
280	1202	65
281	1204	100
282	1213	100
283	1215	-
284	1219	-
285	1227	100
286	1229	100
287	1234	100
288	1238	100
289	1239	100
290	1243	100
291	1250	-
292	1256	-
293	1258	100
294	1262	100
295	1262	100
296	1268	-
297	1269	100

298	1271	-
299	1273	100
300	1275	100