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(D r a f t)

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OUAGADOUGOU
UPPER VOLTA

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MAIZE BREEDING - SAFGRAD PROJECT

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GENETIC IMPROVEMENT

Genetic improvement of maize in the SAFGRAD project was carried out under four major objectives constituting the four areas of activities : (1) Early maturity and yield, (2) Medium maturity and yield, (3) Quality Protein and (4) Drought tolerance. Under each of these objectives, yield trials were conducted to test the performance of various materials, population improvement cycle in the promising composites was continued and breeding to advance and develop additional materials (back-up) were realised. In addition, Uniform testing of promising materials in the semi-arid zone of SAFGRAD member countries was organized and coordinated through the semi-arid regional testing program with the assistance of national programs scientists.

Activities for genetic improvement in Upper Volta were done at 3 locations representing two agroclimatic regions : (1) 700-900 mm rain fall - Kamboinse and Loumbila and (2) 1000-1100 mm - Farako-Bâ. The total rain fall during the cropping season this year was 663 mm at Kamboinse and Loumbila and 755 mm at Farako-Bâ. Thus, from the point of view of rain fall, this year was a bad year at Farako-Bâ where total precipitation fell short by 195 mm from the long term average for this station. Low to moderate level of incidence of maize streak virus and mottle/chlorotic stunt was observed at all the three stations, which was quite severe in late plantings.

In all the genetic improvement trials and breeding nurseries NPK was applied at 74:46:30 kg/ha, and plant population were 53,000 per hectare.

EARLY MATURITY AND YIELD

Early maturing (90 days maturity) high yielding varieties are needed for Sudan savanna zone in semi-arid tropics having annual precipitation of about 800 mm and a growing season of about 3-3½ months.

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Population improvement :

TZE SR (Y) as a population was synthesised and developed at IITA, Ibadan. One cycle of F.S. family selection in this population was completed in 1982. Experimental varieties by recombining 10-12 families were developed and advanced to F2 generation this year. To initiate the second cycle of recurrent selection, 65 selected full-sib families (based on 1982 results) were planted and randomly mated to develop a C1 population. To initiate the 2nd cycle of selection this population has been planted during dry season to develop a new set of full-sib families. These families will be evaluated in international progeny testing trial during 1984. - V.L. ASNANI

Evaluation of early maturing materials :

Twelve early maturing varieties developed and proposed by various national and international institutes were evaluated in a SAFGRAD regional trial, RUVT-1. This trial was conducted at two locations in Upper-Volta, Kamboinsé and Farako-Bâ. The performance of these varieties as compared to a local check is given in Table 1. At Kamboinsé, there were no significant differences for yield among the varieties tested. However, Synth. C, SAFITA-104 and Pop. Senegal Oriental were promising. Among these varieties, SAFITA-104 is the only one which took same number of days to 50 % flowering which was 7-8 days less than the other varieties. At Farako-Bâ, the plant stand, growth and yield were adversely affected by various soil problems. Data, therefore, is comparatively less reliable. However, Pirsabak (1) 7930, E V 8188, E V Gusao 81 Pool 16, TZE SR (W) and Temp. x Trop. N° 3 were the promising varieties. -V.L.ASNANI

Breeding for back-up Pool :

With an objective to develop a wide genetic pool for early maturity and high yield, several early maturing materials were crossed among themselves and also with the selected local varieties. Fifty seven F3 populations of crosses involving Pool-16, Pool-18, TZE 4, TZE 3, SAFITA-2, SAFITA-104, Early yellow, Pool-27 and TZE SR and 5 local varieties were grown during this year. Individual plant selection was done for earliness and vigour and the selected plants were crossed

TABLE 1. PERFORMANCE OF VARIETIES TESTED IN RUVT-1, 1983.

| P E D I G R E E | Grain yield (kg/ha) | | Days to flower | A V E R A G E | |
|----------------------------|---------------------|-----------|-------------------|---------------|------------|
| | Kamboinse | Farako-Bâ | Kamboinse | Plant height | Ear height |
| 1. Synth. C | 4308 | 2410 | 51 | 166 | 85 |
| 2. SAFITA-104 | 4000 | 1692 | 41 | 143 | 54 |
| 3. Pop. Senegal Oriental | 4000 | 1744 | 50 | 166 | 85 |
| 4. Temp. x Trop. N° 42 | 3949 | 2410 | 49 | 167 | 79 |
| 5. Prisabak (1) 7930 | 3949 | 2769 | 47 | 148 | 70 |
| 6. E V Gusao 81 Pool 16 | 3949 | 2564 | 48 | 149 | 71 |
| 7. E V 8188 | 3897 | 2410 | 41 | 146 | 54 |
| 8. Temp. x Trop. N° 3 | 3795 | 2461 | 51 | 153 | 79 |
| 9. SAFITA-2 | 3641 | 2410 | 50 | 155 | 75 |
| 10. TZE SR (W) | 3538 | 2461 | 50 | 168 | 88 |
| 11. E V 7982 | 3282 | 2051 | 48 | 149 | 65 |
| 12. M T S | 3179 | 1744 | 50 | 182 | 105 |
| 13. Check Variety (J.F.S.) | 3949 | 2000 | 43 | 161 | 79 |
| Mean | 3803 | 2240 | 48 | 158 | 76 |
| LSD 5 % | N.S. | 486 | 2.12 | - | - |
| C.V. % | 18.04 | 16.0 | 3.5 | - | - |

among themselves (among different F3 populations). These crosses have been harvested and based on ear characters, equal number of grains from the selected ears have been bulked to develop one white and one yellow grain back-up pool. The two bulks will be grown next year to allow one more generation of random mating within each pool.

Similar program was carried out with the F3 generation of crosses involving 15 US x Trop. materials crossed to Pool-16, Pool-27 and TZE 3 (W). - V.L. ASNANI

MEDIUM MATURITY AND YIELD

Medium maturing (105-110 days maturity) varieties are aimed at northern guinea savanah zone of semi-arid tropics with annual rain fall around 1000 mm in 4 months crop season. These varieties could also be useful in the lower slopes of Soudan savanah zone where season can be stretched due to residual moisture in the soil.

Population Improvement :

TZUT (W) - this population was originally synthesised at IITA, Ibadan. Full-sib families were developed at IITA in 1982 season and the 250 selected families were sent for evaluation at five to six locations during 1983. Kamboinse was one of the location for testing. Population improvement in TZUT (W) is done and testing coordinated by IITA, Ibadan.

The grain yield and other agronomic characters of the selected families based on trial conducted at Kamboinse are given in Table 2 and 3. Average yield of all families was 3627 as compares to best check which yielded 4053 kg/ha. The average yield of selected best 10 families was 4757 and 5077 kg/ha to develop two experimental varieties. Information on the selected families has been sent to IITA, Ibadan to develop the experimental varieties by recombining the best families during 1983 dry season.

TZUT (Y) - this population was derived from original TZUT at IITA, Ibadan by separating the segregating yellow grained seeds. Yellow grain seeds from 305 S1 lines were sent to Kamboinse in 1982, to initiate the population improvement in the SAFGRAD project. S1 lines were recombined during 1982-83 dry season. Another cycle of

Table 2. Performance of selected full-sib families to develop experimental variety Kamboinsé TZUT (W), 1983.

| Families No. | Grain yield (kg/ha) | Days to flower | Plant height | Ear height |
|---------------------------|---------------------|----------------|--------------|------------|
| TZUT. (W) | | | | |
| Fam. 4 | 4907 | 50 | 202 | 100 |
| Fam. 11 | 5547 | 50 | 202 | 95 |
| Fam. 115 | 4907 | 52 | 212 | 108 |
| Fam. 119 | 5120 | 52 | 207 | 97 |
| Fam. 139 | 4693 | 51 | 211 | 102 |
| Fam. 146 | 4480 | 51 | 203 | 105 |
| Fam. 154 | 5333 | 53 | 208 | 115 |
| Fam. 234 | 5120 | 51 | 215 | 103 |
| Fam. 235 | 4693 | 50 | 218 | 110 |
| Fam. 246 | 5973 | 51 | 212 | 112 |
| Mean of selected families | 5077 | 51 | 209 | 105 |
| Mean of all families | 3627 | 51 | 200 | 102 |
| TZB GUSSAO (Check) | 4053 | 52 | 232 | 117 |

Table 3. Performance of selected full-sib families to develop experimental variety Kamboinsé (E) TZUT(W) 1983.

| Families | Grain yield (kg/ha) | Days to flower | Plant height | Ear height |
|---------------------------|------------------------|-------------------|--------------|------------|
| 5 | 4480 | 49 | 213 | 100 |
| 83 | 5120 | 49 | 195 | 87 |
| 90 | 4480 | 48 | 220 | 107 |
| 96 | 5973 | 50 | 214 | 92 |
| 134 | 4693 | 48 | 220 | 110 |
| 192 | 4480 | 48 | 205 | 108 |
| 195 | 4267 | 50 | 212 | 100 |
| 228 | 4693 | 50 | 213 | 120 |
| 243 | 4480 | 49 | 222 | 120 |
| 254 | 4907 | 50 | 217 | 106 |
| Mean of selected families | 4757 | 49 | 213 | 105 |
| Mean of all families | 3627 | 51 | 200 | 102 |
| TZB GUSSAO (check) | 4053 | 52 | 232 | 117 |

recombination was done during 1983 rainy season. One hundred and eighty H.S. families have been planted during the dry season of 1983-84 to develop full-sib families to initiate the first cycle of recurrent selection. Selected 250 F.S. families will be sent for progeny testing trial at 5-6 locations during 1984 rainy season.- V.L. ASNANI

TZSR (Y) 1 :

Population improvement in this composite is being handled by IITA, Ibadan. Selected 250 F.S. families were sent to Upper Volta for testing as one of the 6 locations for conducting this progeny trial. This trial was conducted at Farako-Bâ. Due to early cessation of rains this year, the yield levels at Farako-Bâ were in general low. Grain yield and other agronomic characters of selected families are given in Table 4. The average yield of all families was 2047 kg/ha as compared to 2987 of the best check variety (TZB Gusao). The average yield of selected 10 families was 3989 kg/ha. Information on the selected families has been sent to IITA, for developing the experimental varieties.- V.L. ASNANI & I. HEMA

SAFITA -102 :

This is a white grain composite synthesised and developed in the SAFGRAD project. Phil. DMR composite was crossed to TZPB and advanced to several generations through selective sibbing to develop this population. This composite has been tested in SAFGRAD regional trials and has been found to be promising. In 1983, population improvement program was initiated in this composite. A big size block was planted at Farako-Bâ to develop the full-sib families. Due to adverse climatic conditions only 122 families could be produced. These families will be evaluated in 1984 and C1 population will be produced by recombining the better families.- V.L. ASNANI & I. HEMA

Evaluation of medium maturing materials

Several trials were conducted during the 1983 rainy season to evaluate the performance of various materials developed by IITA, CIMMYT and other international organizations as well as by various national programs. These trials are organized and coordinated by different institutes. The results are summarized below :

Table 4. Performance of selected full sib families to develop experimental variety ^{Farakat-Ba} ~~Kombeinsé~~ TZSR Y (1) 1983.

| Family N ^o . | Grain yield (kg/ha) | Days to flower | Plant height | Ear height |
|-------------------------|---------------------|----------------|--------------|------------|
| 51 | 4053 | 62 | 173 | 92 |
| 69 | 4693 | 64 | 150 | 77 |
| 77 | 3627 | 66 | 145 | 65 |
| 84 | 3840 | 65 | 133 | 62 |
| 98 | 3840 | 63 | 182 | 92 |
| 117 | 4053 | 64 | 190 | 88 |
| 132 | 4053 | 65 | 153 | 78 |
| 160 | 4053 | 63 | 175 | 97 |
| 210 | 4053 | 66 | 152 | 77 |
| 223 | 3627 | 64 | 160 | 68 |
| Average | 3989 | 64 | 161 | 80 |
| Mean of all families | 2047 | 66 | 153 | 73 |
| TZSR (Y) check | 2773 | 63 | 160 | 88 |
| TZB GUSSAO check | 2987 | 65 | 162 | 75 |

EVT LSR (W) :

This trial consists of white grain streak resistant varieties developed at IITA, Ibadan. Nine varieties were tested along with two checks at Kamboinse. The performance of these varieties is presented in Table 5. No significant difference was found among the varieties for grain yield. However, Across 7729 SR, US x Trop. N° 27 (check) and Ejura LSR-W 81 were the higher yielding varieties.

EVT LSR (Y) :

Yellow grain streak resistant varieties (7) developed at IITA and two check varieties were tested in a trial at Kamboinse. Performance of these varieties is given in Table 6. Difference in yield among the varieties was found to be statistically non-significant. However, a check variety, US x Trop. N° 27 gave the highest yield. Among the streak resistant varieties, EV Bertoua LSR (Y) and Tocumen (1) 7835 SR were promising.

EVT 16 A :

Twelve experimental varieties developed by CIMMYT with three checks were tested in this trial at Kamboinse and Loumbila. The performance of these varieties is given in Table 7. At Kamboinse, La Molina (1) 8033, Across 7748 RE and US x Trop. N° 27 (check) were the promising materials. At Loumbila, the yield levels in general were low and C.V. high due to soil problems.

EVT 14 A :

Eleven experimental varieties developed by CIMMYT along with two checks were compared in this trials at two locations -Kamboinse and Loumbila-. The performance of the varieties is presented in Table 8. Significant differences in yield were observed at Loumbila only. At Kamboinse, US x Trop. N° 27 (check), Across 8131, Across 7635 RE and Suwan (1) 8131 were the promising varieties. At Loumbila, the yields were low. US x Trop. N° 27 (check) was the highest yielding entry. Across 8131 performed well at Loumbila also.

Table 5. Performance of varieties tested in EVT.LSR.^(W) at Kamboinsé, 1983.

| PEDIGREE | Grain Yield (kg/ha) | Days to flower | Plant hight | ear hight |
|----------------------|------------------------|----------------|-------------|-----------|
| 1 Across 7729-SR | 3200 | 55 | 189 | 100 |
| 2 US.Trop.Nº27 | 2667 | 55 | 187 | 97 |
| 3 EJURA LSR-W 81 | 2560 | 60 | 186 | 106 |
| 4 Ferke LSR-W 81 | 2453 | 58 | 205 | 111 |
| 5 Sekou LSR-W 81 | 2453 | 60 | 207 | 105 |
| 6 SAFITA-102 | 2347 | 57 | 184 | 100 |
| 7 Across LSR-W 81 | 2240 | 57 | 190 | 101 |
| 8 BERTOUA LSR-W 81 | 2240 | 57 | 197 | 106 |
| 9 Poza Rica 7843 SR | 2133 | 57 | 199 | 105 |
| 10 IKENNE LSR-W 81 | 2027 | 59 | 209 | 136 |
| 11 Poza Rica 7882 SR | 1920 | 59 | 170 | 86 |
| Mean | 2385 | 58 | 193 | 105 |
| L.S.D. 5% | N.S. | N.S. | - | - |
| C.V. % | 41.1 | 4.9 | - | - |

Table 6. Performance of varieties tested in EVT-LSR (Y) at Kamboinse 1983

| PEDIGREE | Grain yield (kg/ha) | Days to flower | Plant height | Ear height |
|-----------------------|------------------------|-------------------|-----------------|---------------|
| 1.US x Trop. N° 27 | 3947 | 50 | 193 | 137 |
| 2.Tocumen (1) 7835 SR | 3627 | 49 | 200 | 116 |
| 3.Bertoua LSR-Y | 3627 | 56 | 237 | 129 |
| 4.Across 7728-SR | 3520 | 54 | 239 | 142 |
| 5.Niaouli LSR-Y | 3413 | 54 | 229 | 127 |
| 6.SAFITA-102 | 3307 | 55 | 215 | 116 |
| 7.Across LSR-Y | 3307 | 55 | 234 | 139 |
| 8.Fereke LSR-Y 81 | 3200 | 55 | 239 | 132 |
| 9.Ikenne LSR-Y | 3200 | 55 | 235 | 127 |
| Mean | 3461 | 54 | 225 | 129 |
| ISD 5 % | N.S. | 1.24 | - | - |
| C.V. % | 12.07 | 1.78 | - | - |

Table 7. Performance of varieties tested in EVT-16 A at Kamboinse and Loumbila, 1983.

| PEDIGREE | Grain yield (kg/ha) | | Days to flower | AVERAGE | |
|-----------------------------------|------------------------|--------------|-------------------|-----------------|---------------|
| | Kamb. | Loumb. | Kamboinse | Plant height | Ear height |
| 1. La Molina (1) 8033 | 5333 | 960 | 44 | 170 | 81 |
| 2. Across 7748 RE | 5227 | 1173 | 44 | 177 | 84 |
| 3. Local check-I US x Trop. N°27/ | 5120 | 1387 | 44 | 198 | 103 |
| 4. Guaira 8045 | 5013 | 2667 | 45 | 180 | 85 |
| 5. Local check-II SAFITA-102 | 4907 | 960 | 41 | 188 | 126 |
| 6. Across 7845 RE | 4907 | 1600 | 41 | 184 | 97 |
| 7. Tlaltizapan 8146 | 4907 | 1493 | 41 | 162 | 83 |
| 8. Across 8033 | 4907 | 1387 | 41 | 175 | 90 |
| 9. Pirsabak 8146 | 4693 | 1067 | 40 | 172 | 89 |
| 10. Local check-III TZB Gussao | 4587 | 1493 | 41 | 204 | 117 |
| 11. Capinapolis 8146 | 4587 | 2133 | 48 | 176 | 91 |
| 12. Across 8146 | 4373 | 1813 | 42 | 160 | 78 |
| 13. La Molina 8146 | 4373 | 1280 | 49 | 164 | 84 |
| 14. Sete Lagoas 8033 | 4160 | 533 | 53 | 166 | 87 |
| 15. Coimbatore 8146 | 3947 | 1600 | 54 | 168 | 82 |
| Average | 4736 | 1436 | 45 | 176 | 92 |
| LSD 5 % | 1003 | N.S. | 1.12 | - | - |
| C.V. % | 15.36 | 88.46 | 2.02 | - | - |

Table 8. Performance of varieties tested in EVT 14 A at Kamboinse and
Lbumbila, 1983.

| PEDIGREE | Grain yield (kg/ha) | | Days to flower | AVERAGE | |
|------------------------------------|------------------------|--------|-------------------|-----------------|---------------|
| | Kamb. | Loumb. | Kamboinse | Plant height | Ear height |
| 1. Across 8131 | 3733 | 1280 | 53 | 161 | 79 |
| 2. Check variety N°1 USxTrop.N°27/ | 3627 | 1707 | 52 | 198 | 104 |
| 3. Suwan (1) 8131 | 3627 | 1173 | 48 | 164 | 80 |
| 4. Across 7635 RE | 3520 | 960 | 49 | 179 | 88 |
| 5. Pozarica 8126 | 3413 | 640 | 49 | 179 | 94 |
| 6. Suwan 8131 | 3413 | 1280 | 48 | 167 | 79 |
| 7. La Molina 8131 | 3307 | 1067 | 48 | 162 | 87 |
| 8. Islamabad (1) 8131 | 3093 | 1280 | 52 | 171 | 84 |
| 9. Across 7726 RE | 2987 | 427 | 53 | 177 | 86 |
| 0. Suwan 8126 | 2880 | 640 | 54 | 175 | 90 |
| 1. Across 8035 | 2880 | 533 | 50 | 167 | 81 |
| 2. Iboperenda 8035 | 2560 | 747 | 52 | 167 | 77 |
| 3. Check variety N°2 SAFITA-102 | 2453 | 640 | 56 | 180 | 88 |
| Mean | 3192 | 952 | 51 | 160 | 86 |
| SD 5 % | N.S. | 267 | 11.84 | - | - |
| S.V. % | 29.0 | 15.73 | 18.4 | - | - |

RUVT-2 :

SAFGRAD Regional Variety Trial RUVT-2 in Upper Volta was conducted at two locations -Kamboinse and Farako-Bâ-. The trial at Farako-Bâ was conducted by IVRAZ-IRAT program. Eleven varieties developed by different national and international institutes along with one check variety were tested in this trial. At Kamboinse, significant differences for yield were obtained. IRAT 178, US x Trop. N° 27, TZPB (Onne) and Pool 34 QPM (check) gave about the same yield. Pool 34 QPM and US x Trop. N° 27 were 4-5 days early in days to flower. Bako composite was un-adapted to this climate. The data from Farako-Bâ are not yet statistically analyzed. However, looking at the mean yield, IRAT 178, US x Trop. N° 27 seem to be promising giving similar yield (6.8 tons/ha). Data on grain yield and other agronomic characters is presented in Table 9.

Pioneer material :

On the request of Pioneer seed company, seven of their hybrids with two check varieties were tested in this trial at Kamboinse and Loumbila. Differences in yield at both locations were statistically non-significant. However at Kamboinse, hybrid x 304 C, US x Trop. N° 27 (check) and hybrid 507 were the better entries. At Loumbila, US x Trop. N° 27 gave the highest yield followed by 6875 R and 304 C. The performance of different entries is given in Table 10.- V.L. ASNANI

QUALITY PROTEIN

Development of quality protein maize (QPM) varieties is not a major program in the SAFGRAD project. However, some efforts have been put to test the QPM materials developed by CIMMYT to identify the best population/variety for the semi-arid environment. Some efforts have also gone to improve the population identified as the most promising for this ecology.

Population improvement

Pool 34 QPM :

This quality protein population developed by CIMMYT was identified as promising material in this environment (trial conducted in 1982) not only for yield but also from the hard endosperm and its stability point of view. Full-sib families were produced in the dry season

Table 9. Performance of varieties tested in RUVT-2 at Kamboinsé, 1983

| PEDIGREE | Grain yield (kg/ha) | Days to flower | Plant height | Ear height |
|-----------------------------|------------------------|-------------------|--------------|------------|
| 1 IRAT 178 | 3787 | 55 | 193 | 103 |
| 2 Check variety Pool 34 QPM | 3787 | 50 | 175 | 90 |
| 3 TZPB (ONNE) | 3733 | 59 | 215 | 117 |
| 4 Temp.Trop.Nº27 | 3733 | 52 | 194 | 96 |
| 5 TZSR-1 | 3680 | 56 | 214 | 133 |
| 6 EV 8176 | 3680 | 56 | 220 | 132 |
| 7 Poza Rica 7843 | 3573 | 57 | 212 | 123 |
| 8 SAFITA-102 | 3573 | 55 | 196 | 111 |
| 9 Elite x E. Mex lomp. | 3413 | 55 | 211 | 123 |
| 10 ATK 82 ZR | 3360 | 56 | 199 | 110 |
| 11 Fereke 7622 | 3147 | 55 | 198 | 109 |
| 12 Bako Lomp. | 800 | 66 | 265 | 162 |
| Mean | 3356 | 56 | 208 | 117 |
| LSD. 5% | 720 | 1.49 | 12.63 | 18.42 |
| C.V. % | 15.49 | 2.02 | 4.21 | 10.9 |

Table 10. Performance varieties tested in "Pioneer trial" 1983 in two locations Kamboinsé & Loumbila".

| PEDIGREE | Grain yield (kg/ha) | | Days to flower | Average | |
|-----------------|---------------------|----------|----------------|--------------|------------|
| | Kamboinsé | Loumbila | Kamboinsé | Plant height | Ear height |
| 1 X 304 C | 4907 | 2027 | 55 | 182 | 99 |
| 2 US. TROP N°27 | 4373 | 2133 | 57 | 175 | 86 |
| 3 507 | 4160 | 747 | 56 | 168 | 98 |
| 4 3094 | 3840 | 747 | 56 | 179 | 101 |
| 5 6875 R.22 | 3413 | 2155 | 57 | 177 | 98 |
| 6 SAFITA-102 | 3413 | 853 | 55 | 173 | 97 |
| 7 3204 MF | 3413 | 427 | 53 | 173 | 97 |
| 8 5065 A. | 3200 | 853 | 56 | 180 | 106 |
| 9 X 5800 | 2667 | 640 | 56 | 175 | 99 |
| Mean | 3710 | 1176 | 56 | 176 | 98 |
| LSD. 5% | 1056 | 1373 | 1.49 | - | - |
| C.V.% | 19.43 | 60.68 | 2.02 | - | - |

1982-83 and the selected families were planted at Kamboinse in 1983 season for evaluation in breeding nursery. The best 10 families will be planted in 1983-84 dry season to develop an experimental variety for testing in 1984 rainy season. C1 population will also be developed during the 1983 dry season to initiate normal full-sib recurrent selection program in 1984. Ten seeds of 107 F.S. families have been sent to CIMMYT, Mexico for chemical analysis to monitor the protein quality. These results will be utilized to develop the experimental variety as well as the C1 population.

Evaluation of QPM materials :

Nine QPM varieties developed by CIMMYT and one QPM check along with two normal maize varieties were tested in EVT 15 A trial at Kamboinse. Performance of these materials is presented in Table 11. There were no significant differences among the varieties for yield. The highest yielding entry was E V Los Banos 8140 followed by Pool-34 QPM (check) and San Jeronimo (1) 8140. Pool 34 QPM was about 5-6 days early in days to 50 % flowering. - V.L. ASNANI

DROUGHT TOLERANCE

Risk of drought is one of the major factor affecting yield stability in the sudan savanah zone of semi-arid tropics. Drought spells occur in the northern guinea savanah zone also and could substantially affect the grain yield. Initiated in 1981-82 dry season, breeding for drought tolerance is becoming one of the major activity of the genetic improvement in the SAFGRAD project.

Evaluation of materials :

Preliminary work to evaluate different genetic materials for tolerance to drought was done by conducting a trial with 26 populations representing wide genetic back ground at Loumbila in 1981-82 dry season (with irrigation). In spite of unforeseen problems making the conclusions difficult, two populations -Pool-16 and Jaune Flint de Saria- seemed to be more tolerant to water stress as compared to other material tested.

In 1982-83 dry season, a similar trial was conducted at Vallée du Kou (near Bobo-Dioulassa) to compare the performance of 12 populations/varieties for tolerance to drought at seedling, flowering and at grain filling stage. Water stress was imposed by cutting-off irrigation for 2-3 weeks in different blocks and comparing the performance without the water stress. Data on several morphological and physiological characters were taken. All the data have not yet been statistically analyzed. However, on the basis of average performance it was observed that three populations viz Pool 16, Jaune Flint de Saria and TZE 4 seem to have better tolerance to water stress as compared to other materials. On the basis of review of literature as well as our data and observations, it seems that three characters are positively correlated to drought tolerance -1. Synchronous male and female flowering 2. Lower plant height (up to certain height) and 3. small tassel size. - V.L. ASNANI, A.O. DIALLO & I. HEMA

Population improvement :

Based upon our results and also the information obtained from other institutions, three populations were selected for the population improvement program during 1983 season. These populations are : (1) Pool 16 and SAFITA-2 (2) Tuxpeno D.R. (from CIMMYT) and (3) SAFITA-104 x German inbred line (obtained as having tolerance to drought). Full-sib recurrent selection program was initiated in 1983 rainy season. Full-sib families were developed in the three populations by crossing the plants selected on the basis of three characters mentioned above (considered to be related to drought stress), 263 full-sibs in Pool 16-SAFITA-2, 205 in Tuxpeno D.R. and 41 F.S. families in SAFITA-104 x German line have been finally selected. All these families along with four checks have been planted in replicated trial at VLbumbila during 1983 dry season. These families will be evaluated for their performance under 2-3 weeks of water stress at seedling stage and at grain filling stage in two different blocks. The third block will not get any stress. Based on the performance of these F.S. families, populations will be reconstituted and experimental varieties developed recombining the selected families. - V.L. ASNANI, A.O. DIALLO & I. HEMA

Breeding for Back-up Pool :

In 1981-82 dry season, 76 individual plants from the preliminary trial which ^{was} conducted at Lumbila (described above) were selected as

drought tolerant and were selfed. These 76 S1 ears were planted during 1982 and were sib increased. The S1 sibbed materials along with some other S1 lines (drought tolerant plants selfed) of JFS, TZPB and SAFITA-2 were planted for seed increase in 1983 rainy season. This material now represents a wide genetic base and all these have been planted in large size plots at Loumbila during the dry season of 1983-84. This whole block will be subjected to 2-3 weeks of water stress at seedling stage (20-21 days after planting) and again at grain filling stage (15-20 days after 50 % silking). Individual plants, irrespective of material, will be selected at flowering and crossed among themselves to produce one early maturing and one medium maturing bulk back-up population. Final selection of plants will be done after they have been exposed to water stress at grain filling period. The two populations will be used as back-up pools for future work on breeding for drought tolerance. - V.L. ASNANI, A.O. DIALLO & I. HEMA

COLLECTION AND EVALUATION OF LOCAL VARIETIES :

National Upper Volta maize program cooperates and collaborates in our SAFGRAD project activities. One of the objective of national program is to collect, evaluate and catalogue the local varieties grown in different parts of Upper Volta. A total of 210 local varieties collected from different parts of the country were grown in separate trials at Kamboinse and Loumbila for evaluation and seed increase. Data on several morphological characters were taken. Table 12 presents the data on some characters of the selected local varieties. The promising varieties identified are : Kamandaogo tolo, Boursango tolo, Kamanyango windigui, Kamandaogo kobo, Local Yellow Saria, Koudougou 1 and Noubindou si Mossi.

In addition, 5 local varieties have been selected to develop an extra early (75 days to maturity) population. These varieties are Kamandaogo tolo, Boursanga tolo, Kamangbe Kapibabora, Korion Kouro and Tinzin Zambo. These varieties have been planted in the dry season 1983-84 to develop a composite through chain crossing. Extra early composite will be useful for sahel savanah zone and also for specific farming system situations in other semi-arid ecologies. - V.L. ASNANI & I. HEMA

Table 12. Performance of varieties tested in local material, Kamboinsé, 1983

| PEDIGREE | Yield (kg/ha) | Days to flower | Plant height | Ear height |
|-------------------------|---------------|----------------|--------------|------------|
| 1. Kamandaogo Tollo | 2667 | 36 | 137 | 47 |
| 2. Boursango Tolle | 2453 | 38 | 135 | 47 |
| 3. Kamandaogo Kobo | 2347 | 38 | 158 | 68 |
| 4. Kamanyanga windigui | 2240 | 36 | 142 | 55 |
| 5. Kaman yanga Rambo | 2133 | 41 | 162 | 63 |
| 6. Kamandaogo Rambo | 2133 | 42 | 154 | 62 |
| 7. Local Y. Koudougou 1 | 2027 | 42 | 198 | 108 |
| 8. Local Y Sarria | 2027 | 37 | 164 | 83 |
| 9. Noubindou Si Mossi | 2027 | 37 | 139 | 63 |
| 10. Local Y. Ouagarou | 1920 | 49 | 191 | 100 |
| 11. Yakaraghin ingané | 1813 | 35 | 142 | 53 |

SEMI-ARID SAFGRAD REGIONAL TESTING

Two Uniform Variety trials RUVT-1 and RUVT-2 are organized and coordinated by SAFGRAD project each year. RUVT-1 consists of early maturing varieties and RUVT-2 consists of medium maturing varieties. The varieties to be tested in these trials are nominated by various national and international institutions participating in the SAFGRAD project. Twenty seven countries participate on voluntary basis to conduct these trials in their national program. In 1983, 50 sets of RUVT-1 and 35 sets of RUVT-2 were sent to 24 countries. At the time of writing this report data has not yet been received from these countries. Data from cooperators is normally received by February and the results will be reported and presented in the workshop scheduled to be held in March 1984 at IITA, Ibadan.

PRODUCTION PLOTS AND SEED INCREASES

In collaboration with National Seed Service and the extension office, twelve half/hactare plots of SAFITA-2 were established in the farmers fields. In general the farmers were satisfied with the performance of this variety. These production plots served as seed production plots and about 10.0 tons of seed is available for use during the next year.

Foundation seed of SAFITA-104 and SAFITA-102 were also produced in $\frac{1}{2}$ to 1.0 hactare isolation plots at Kamboinse. This seed will be used in 1984 by National Seed Service.

In addition, more than 100 varieties/composites of different origin were sib pollinated for seed multiplication for various purposes to be used during the next season.

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