

USAID/SAFGRAD/OAU-STRC/ICRISAT  
West and Central Africa Sorghum Research Network  
(WECASORN)

# SYNTHESIS OF PRIMARY DATA

VOLUME TWO - TABLES AND FIGURES

ICRISAT

International Crops Research Institute for the Semi-Arid Tropics  
Patancheru P.O., Andhra Pradesh 502 324, India  
B.P. 320, Bamako, Mali

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## A N N E X

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## SUMMARY OF VOLUME ONE

The West and Central Africa Sorghum Research Network (WECASORN) became operational in 1985 and received a grant of 1.6 million dollars in 1986 from USAID as part of Phase II of SAFFGRAD. This grant was sub-contracted to ICRISAT whose West African Sorghum Improvement Program in Mali (WASIP-Mali) executes the project with the provision of a Coordinator. WECASORN addresses the sorghum improvement problems in West Africa by concentrating on constraints having regional significance and by establishing the necessary links with national, regional and international institutes in order to serve the entire region effectively. The Network activities emphasize short term training, regional trials, research projects, monitoring tours, regional workshops and visits to NARS. The Coordinator implements the decisions of the steering committee which meets on the average twice a year, and is the driving force of the Network. The steering committee consists of representatives from Mali (Chairman), Burkina Faso, Cameroon, Senegal, Nigeria and Chad and the Coordinator. Representatives from SAFFGRAD, USAID, INSAH, IRAT, and ICRISAT are observers.

During Phase II of SAFFGRAD (1986-1992) changes in performance of research institutions, human resource and policy environment for research in the 17 member countries of WECASORN came about through the six major activities cited above and through policy decisions of the steering committee meeting. Since 1989 WECASORN has funded six research projects in five Lead Centers (countries). The projects are on leaf anthracnose in Burkina Faso, Long smut and grain quality in Niger, head bugs in Mali, *Striga* in Cameroon, and wheat-sorghum composite flour in Nigeria. Since 1986 two varietal and one hybrid trials were conducted. A disease nursery and a *Striga* trial were initiated in 1987 and 1988, respectively. The projects on anthracnose, long smut, head bugs and *Striga* identified resistant genotypes to the corresponding biotic stress. In the case of leaf anthracnose the genotypes included local land races from Burkina Faso. Results from the head bug project in Mali indicated that the population of the insect was more abundant towards the end of September and October. A significant finding from the long smut project was a positive correlation between infection and maturity cycle of the genotypes tested. Late maturing genotypes were more susceptible. Results from the wheat-sorghum composite flour showed that under laboratory conditions acceptable bread can be produced with up to 50% level of wheat substitution by sorghum. However, the volume of the composite bread was lower with shorter shelf life compared to 100% wheat bread. From limited sales, the composite bread was more popular especially among low income groups.

Whereas in 1986 all the test varieties in the West African Sorghum Variety Adaptation Trial early and medium duration (WASVAT-E, WASVAT-M) and the West African Sorghum Hybrid Adaptation Trial (WASHAT) were ICRISAT varieties, by 1991, 73, 53 and 11% of the test varieties, respectively, were from NARS. Similarly, NARS contributed no varieties to the West African Sorghum Disease Resistance Nursery (WASDRN) in 1987 and only 9% to the West African

Resistance Nursery (WASDRN) in 1987 and only 9% to the West African Sorghum *Striga* Trial (WASST) in 1988. By 1991, 43 and 100% of the varieties for WASDRN and WASST, respectively, were from NARS. A total of 206 varieties and 89 hybrids were tested between 1986 and 1991. Thirty-five varieties and one hybrid are at various levels of use in seven NARS. The 35 varieties constitute 17% of the total 206 varieties tested in the regional trials. Seventeen or 48.5% of the 35 varieties were contributed by NARS and 18 or 51.5% were contributed by ICRISAT. Considering the 35 varieties under use, 13 or 37.1% are being tested in farmers' fields in three countries, six (17.1%) are being observed at research stations in three countries, and one variety each (2.8%) is either in demonstration plots or in multilocation tests in two separate countries. Eight varieties (22.8%) are at the pre-release stage in five countries and one variety (2.8%) has been released in one country. Furthermore, 20 varieties (57.1%) have been used in crosses in four countries.

Between 1987 and 1991, 15 and 35 varieties from WASDRN were identified as either resistant or moderately resistant to leaf anthracnose and gray leaf spot, respectively. Results from WASST between 1988 and 1991 identified 10 varieties with relatively low *Striga* counts.

Human resource development was enhanced by short-term training on *Striga* control in 1987, on agronomic research and on-farm testing in 1989, and on crop protection in 1991. Twelve, 9 and 3 participants from NARS attended the three training programs, respectively. In addition to short term training, three regional workshops, four monitoring tours, three working group meetings on research projects, a special meeting on *Striga* and visits to NARS by steering committee members were organized by WECASORN during Phase II of SAFGRAD. The steering committee, the policy making body of WECASORN, met 11 times between 1986 and 1992.

Resident research carried out by the Coordinator identified 21 varieties resistant to grain mold, 16 varieties resistant to leaf anthracnose, 11 of which were local varieties from six NARS, and three varieties resistant to sooty stripe. Seeds of these resistant varieties and the results obtained were sent to breeders in nine NARS. In addition, an artificial inoculation technique for sooty stripe was developed and was successfully tested by the national program of Burkina Faso.



Table 1. Sorghum Production in WECCASORN Countries<sup>1</sup>.

| Country          | Area<br>Harvested<br>(1000 ha) | Yield<br>(kg/ha) | Production<br>(1000 MT) |
|------------------|--------------------------------|------------------|-------------------------|
| Benin            | 125 F                          | 840              | 105                     |
| Burkina Faso     | 1295                           | 779              | 1009                    |
| Cameroon**       | 470                            | 872              | 410                     |
| Centr.Afr.Rep.** | 60 F                           | 833              | 50 F                    |
| Chad             | 990*                           | 697              | 690 *                   |
| Côte d'Ivoire    | 38                             | 632              | 24                      |
| Gambia**         | 70 F                           | 1057             | 74 *                    |
| Ghana            | 240 F                          | 729              | 175                     |
| Guinea           | 6 F                            | 667              | 4 F                     |
| Guinea Bissau    | 60 F                           | 583              | 35                      |
| Mali**           | 1624 F                         | 1170             | 1900 *                  |
| Mauritania**     | 133 F                          | 689              | 89                      |
| Niger            | 1470                           | 410              | 603                     |
| Nigeria          | 4500                           | 1098             | 4940 F                  |
| Senegal**        | 1026                           | 618              | 634                     |
| Sierra Leone     | 8 F                            | 2375             | 19 F                    |
| Togo             | 178                            | 674              | 120 *                   |
| World            | 45590                          | 1355             | 61787                   |
| Africa           | 17556                          | 870              | 15280                   |

1. Source: The FAO Production Yearbook 1988.

F = FAO estimate

\* = Preliminary data

\*\* = Sorghum plus millet data.

Table 2. Distribution of the more important biotic and abiotic stress factors of sorghum and classification of national programs into Lead, associate, and Technology Adapting Countries.

| Country       | Insects |     |    | Diseases |    |    |    | <i>Striga</i> | Grain |    |    |    |
|---------------|---------|-----|----|----------|----|----|----|---------------|-------|----|----|----|
|               | PAN     | BOR | GM | SS       | AN | GL | LS |               | QL    | UT | DR | ST |
| Burkina Faso  | A       | A   | L  | A        | L  | A  |    | A             | A     |    |    |    |
| Cameroon      |         |     |    | A        | A  | A  |    | L             |       |    | A  | A  |
| Mali          | L       |     | A  | A        | A  | A  | A  | A             | A     |    | A  | A  |
| Niger         |         | A   |    |          |    |    | L  |               | L     |    | A  |    |
| Nigeria       | A       | L   | A  |          |    |    | A  | A             |       | A  | A  | L  |
| Côte d'Ivoire | A       |     |    |          |    |    |    |               |       |    |    |    |
| Ghana         | A       |     | A  |          |    |    |    |               |       |    |    |    |
| Benin         |         |     |    |          |    |    |    |               |       |    |    |    |
| CAR           |         |     |    |          |    |    |    |               |       |    |    |    |
| Tchad         |         |     |    |          |    |    |    |               |       |    |    |    |
| Gambia        |         |     |    |          |    |    |    |               |       |    | A  |    |
| Guinea        |         |     |    |          |    |    |    |               |       |    |    |    |
| Guinea Bissau |         |     |    |          |    |    |    |               |       |    |    |    |
| Mauritania    |         |     |    |          |    |    |    |               |       |    |    |    |
| Senegal       |         |     |    |          |    |    |    |               |       |    |    |    |
| Sierra Leone  |         |     |    |          |    |    |    |               |       |    |    |    |
| Togo          |         |     |    |          |    |    |    |               |       |    |    |    |

1. Stress factors: PAN: panicle, BOR:borers, GM: grain molds, SS: sooty stripe, AN: leaf and stem anthracnose, GL: gray Leaf spot, LS: Long smut, QL: grain quality, UT: grain utilization, DR: draught, ST: stand establishment. Classification: L: Lead Centers, A: Associate Centers. The others are Technology Adopting Centers.

Table 3. Country, project title, amount paid so far and reports received for the six research projects of WEICASORN.

| Country               | Project title  | Amount paid and date |         |          | Reports Received   |                        |
|-----------------------|--|----------------------|---------|----------|--------------------|------------------------|
|                       |  | \$                   | CFA     | Date     | Technical          | Financial <sup>4</sup> |
| Burkina Faso          | Identification of sources of resistance to leaf anthracnose of sorghum ( <i>Sorghum bicolor</i> ) caused by <i>Colletotrichum graminicola</i> (ces) Wilson in Burkina Faso | 2500                 | 877500  | 28/6/89  | Preliminary, 1989  | Complete               |
|                       |  | 2500                 | 787238  | 24/11/89 | First year, 1989   | Complete               |
|                       |  | 2500                 | 712500  | 22/6/90  | Second year, 1990  | Complete               |
|                       |  | 4000                 | 1120000 | 7/5/91   | Third year, 1991   | Complete               |
| Cameroon <sup>1</sup> | Screening of local germplasms of Cameroon and other countries against <i>Striga hermonthica</i> in heavily infested field conditions                                       | 2500                 | 705000  | 29/6/90  | First year, 1990   | Complete               |
|                       |  | 2500                 | 700000  | 7/5/91   | Second year, 1991  | Complete               |
| Mali                  | Studies on head bugs of sorghum in Mali  | 2500                 | 827500  | 26/6/89  | Preliminary, 1989  | Complete               |
|                       |  | 2500                 | 790000  | 25/10/89 | First year, 1989   | Complete               |
|                       |  | 2500                 | 712500  | 19/6/90  | Second year, 1990  | Complete               |
|                       |  | 2500                 | 630500  | 26/10/90 | Third year, 1991   | Complete               |
| Niger                 | 1. Identification of resistance to long smut   | 2500 <sup>2</sup>    | -       | -        | Preliminary, 1989  | Complete               |
|                       |  | 5000                 | 1200000 | 5/9/92   | Third year, 1991   | Complete               |
|                       | 2. Morphologic, Chemical and Nutritive Characterization of seeds of local and improved sorghum in West and Central Africa  | 2500                 | 700000  | 7/5/91   | -                  | -                      |
| Nigeria               | Technology for production of acceptable wheat-sorghum composite bread and confectionery  | 2500 <sup>3</sup>    | -       | -        | Preliminary, 1989  | Complete               |
|                       |  | 2500 <sup>3</sup>    | -       | -        | First year 1989/90 | Complete               |
|                       |  | 5589 <sup>3</sup>    | -       | -        |                    |                        |

1. Received \$ 5000 in 1992

2. Paid through ICRISAT Sahelian Center, Niamey.

3. Paid through ICRISAT, Kano.

4. Complete = Total amount justified.

Table 3A. Financial support to non-lead (associate) NARS towards their research activities on sorghum in 1990 and 1991.

| Country             | Amount received<br>(in US dollars) |                   |
|---------------------|------------------------------------|-------------------|
|                     | 1990                               | 1991 <sup>2</sup> |
| 1. Benin            | 1000                               | 0                 |
| 2. CAR <sup>1</sup> | 1000                               | 2000              |
| 3. Côte d'Ivoire    | 1000                               | 2000              |
| 4. Gambia           | 1000                               | 0                 |
| 5. Ghana            | 1000                               | 2000              |
| 6. Guinea           | 1000                               | 2000              |
| 7. Guinea Bissau    | 1000                               | 0                 |
| 8. Mauritania       | 1000                               | 2000              |
| 9. Senegal          | 1000                               | 2000              |
| 10. Sierra Leone    | 1000                               | 2000              |
| 11. Tchad           | 1000                               | 0                 |
| 12. Togo            | 1000                               | 2000              |
| Total               | <u>12000</u>                       | <u>16000</u>      |
| Grand Total         | 28 000                             |                   |

1. CAR = Central African Republic
2. Four countries did not receive funds because upto August 1991 when the \$ 2000 was sent to the others, they had not justified expenditure of the \$ 1000 sent in 1990.

Table 4. Entries in WASVAT early and medium and WASHAT Trials 1986.

| WASVAT-E                | WASVAT-M                | WASHAT   |
|-------------------------|-------------------------|----------|
| ICSV 2 BF               | ICSV 23 BF              | ICSH-208 |
| ICSV 7-1 BF             | ICSV 1038 BF            | ICSH-221 |
| ICSV 16-3 BF            | ICSV 1044 BF            | ICSH-228 |
| ICSV 16-5 BF            | ICSV 1047 BF            | ICSH-229 |
| ICSV 85-2 BF            | ICSV 1056 BF            | ICSH-230 |
| ICSV 94-1 BF            | ICSV 1057 BF            | ICSH-231 |
| ICSV 1031 BF            | ICSV 1058 BF            | ICSH-232 |
| ICSV 1045 BF            | ICSV 1063 BF            | ICSH-241 |
| ICSV 1054 BF            | ICSV 1067 BF            | ICSH-357 |
| ICSV 1055 BF            | ICSV 1070 BF            | ICSH-358 |
| ICSV 1060 BF            | ICSV 1074 BF            | ICSH-359 |
| ICSV 1061 BF            | ICSV 1077 BF            | ICSH-260 |
| ICSV 1062 BF            | ICSV 1080 BF            | ICSH-263 |
| ICSV 1064 BF            | PM 11344                | ICSH-284 |
| ICSV 1065 BF            | IRAT 277                | ICSH-285 |
| ICSV 1078 BF            | IS 915                  | ICSH-287 |
| IRAT 203                | ICSV 126 IN             | ICSH-290 |
| Mali Sor 84-7           | ICSV 2 IN               | ICSH-299 |
| ICSH-1 (Hybrid Control) | ICSH-1 (Hybrid Control) | ICSH-305 |
| Local (Control)         | Local (Control)         | ICSH-311 |
|                         |                         | ICSH-319 |
|                         |                         | ICSH-331 |
|                         |                         | ICSH-336 |
|                         |                         | ICSH-109 |
|                         |                         | ICSH-110 |
|                         |                         | ICSH-153 |
|                         |                         | ICSH-159 |
|                         |                         | ICSH-134 |
|                         |                         | ICSH-178 |
|                         |                         | CSH-5    |
|                         |                         | CSH-6    |
|                         |                         | Framida  |

All ICSVs, ICSH, PM lines and Framida were contributed by ICRISAT West African Program. Malisor 84-7 is from ICRISAT/Mali Bilateral Program, IRAT lines are from the IRAT Program in Burkina Faso. IS 915 is from ICRISAT's germplasm collection.



Table 5. Entry number, variety name, Pedigree and source of entries WASVAT early duration Trial, 1987.

| Entry Number | Variety                 | Pedigree                                    | Source   |
|--------------|-------------------------|---|----------|
| 1            | Nagawhite               | -   | Ghana    |
| 2            | S-35                    | -   | Cameroon |
| 3            | Malisor 84-5            | -   | Mali     |
| 4            | CE 180-33               | -   | Senegal  |
| 5            | CE 194-19               | -   | Senegal  |
| 6            | 82-7-BK2                | P 967 083 X SEPON 45                        | Niger    |
| 7            | M 24733                 | ((SC 108 x CS 3541)16-3 x -1-3/R 2751)5-2-3 | ICRISAT  |
| 8            | ICSV 111 IN             | (SPV 35 x E 35-1) CS 3541) - 8 - 1          | ICRISAT  |
| 9            | ICSV 230 IN             | (SPV 475 x QL - 3) - 1 - 1 - 2              | ICRISAT  |
| 10           | ICSV 247 IN             | (E 36-1 x CS 3541) - 3 - 15 - 1 - 2 - 2     | ICRISAT  |
| 11           | ICSV 1082 BF            | Tetron x ICSV 1002 BF                       | ICRISAT  |
| 12           | ICSV 1083 BF            | (ICSV 1004 BF x ISVAT 82/Entry 10) - 1 - 3  | ICRISAT  |
| 13           | ICSV 1084 BF            | ICSV 1003 BF x CSV-11                       | ICRISAT  |
| 14           | ICSV 1085 BF            | (ICSV 1004 BF x CSV-11) - 1 - 2             | ICRISAT  |
| 15           | ICSV 1086 BF            | (82-S-82 x CSV-11) - 4 - 2                  | ICRISAT  |
| 16           | ICSV 1087 BF            | Selection of ICSV 1002 BF                   | ICRISAT  |
| 17           | ICSV 1078 BF            | E 35-1 x IS 8785                            | ICRISAT  |
| 18           | ICSV 1054 BF            | E 35-1 x IS 8785                            | ICRISAT  |
| 19           | ICSH 109 Hybrid Control | 296 A x MR 844                              | ICRISAT  |
| 20           | Local variety           |   |          |

Table 6. Entry number, variety name, their pedigree, and program of origin of entries in WASVAT early, 1988.

| Entry No. | Name               | Pedigree                               | Contributing Program |
|-----------|--------------------|--|----------------------|
| 1         | Nagawhite          | -                                      | Ghana                |
| 2         | S-35               | -                                      | Cameroon             |
| 3         | Malisor 84-5       | -                                      | Mali                 |
| 4         | CE 180-33          | -                                      | Senegal              |
| 5         | CE 194-19          | -                                      | Senegal              |
| 6         | ICSV 401 IN        | -                                      | ICRISAT              |
| 7         | ICSV 210 IN        | -                                      | ICRISAT              |
| 8         | ICSV 111 IN        | [SPV 35 x E 35-1) IS 3541]-81          | ICRISAT              |
| 9         | ICSV 230 IN        | (SPV 475 x QL-3)-1-1-1-2               | ICRISAT              |
| 10        | ICSV 247 IN        | (E 36-1 x CS 3541)-3-15-1-2-2          | ICRISAT              |
| 11        | ICSV 1082 BF       | Tetron x ICSV 1002 BF                  | ICRISAT              |
| 12        | ICSV 1083 BF       | (ICSV 1004 BF x ISVAT 82/Entry 10)-1-3 | ICRISAT              |
| 13        | ICSV 1084 BF       | (ICSV 1003 BF x CSV-11)                | ICRISAT              |
| 14        | ICSV 1095 BF       | (ICSV 1004 BF x CSV-11)-1-2            | ICRISAT              |
| 15        | ICSV 1086 BF       | (82-S-82 x CSV-11)-4-2                 | ICRISAT              |
| 16        | ICSV 1087 BF       | Framida X E 35-1                       | ICRISAT              |
| 17        | ICSV 1078 BF       | E 35-1 X IS 8785                       | ICRISAT              |
| 18        | ICSV 1054 BF       | E 35-1 x IS 8785                       | ICRISAT              |
| 19        | IRAT-204 (Control) | -                                      | ICRISAT              |
| 20        | Local Control      | -                                      | ICRISAT              |

Table 7. Entry number, variety name and program of origin of entries in WASVAT early, 1989, 1990.

| Entry No. | Variety             | Originating program |
|-----------|---------------------|---------------------|
| 1         | CS 54               | Cameroon            |
| 2         | CS 61               | Cameroon            |
| 3         | CE 151-382          | Senegal             |
| 4         | CE 196-7-2-1        | Senegal             |
| 5         | Nabana Beida        | Mauritania          |
| 6         | Lekwere Bedha       | Mauritania          |
| 7         | ICSV 242 IN         | ICRISAT Reg/Nigeria |
| 8         | ICSV 258 IN         | "-                  |
| 9         | ICSV 401 IN         | "-                  |
| 10        | ICSV 1079 BF        | ICRISAT Reg/Mali    |
| 11        | ICSV 1070 BF        | "-                  |
| 12        | ICSV 1177 BF        | "-                  |
| 13        | ICSV 1172 BF        | "-                  |
| 14        | ICSV 1174 BF        | "-                  |
| 15        | ICSV 1125 BF        | "-                  |
| 16        | ICSV 1175 BF        | "-                  |
| 17        | ICSV 1176 BF        | "-                  |
| 18        | Nagawhite (Control) | Ghana               |
| 19        | ICSV 111 IN ( " )   | ICRISAT             |
| 20        | Local               |                     |

Table 8. Entry number, variety name and program of origin of entries in WASVAT early, 1991 and 1992.

| Entry No. | Genotype              | Program of origin      |
|-----------|-----------------------|------------------------|
| 1         | NR 71176              | Nigeria                |
| 2         | NR 71169              | Nigeria                |
| 3         | CE 145-66 TRANS 2     | Senegal                |
| 4         | CE 314-18             | Senegal                |
| 5         | CE 315-14-1-1         | Senegal                |
| 6         | SSV-2                 | Senegal                |
| 7         | CSM 219               | Mali                   |
| 8         | Mota-Maradi           | Niger                  |
| 9         | 90 W 194              | ICRISAT                |
| 10        | 90 W 186              | ICRISAT                |
| 11        | 90 W 197              | ICRISAT                |
| 12        | ICSV 401 IN (Control) | ICRISAT                |
| 13        | Nagawhite (Control)   | Ghana national program |
| 14        | Local (control)       |                        |

Table 9. Entry number, variety name, Pedigree and source of entries in WASVAT medium duration Trial, 1987.

| Entry Number | Variety         | Pedigree  | Source       |
|--------------|-----------------|---|--------------|
| 1            | S-34            | -   | Cameroon     |
| 2            | Malisor 84-1    | -   | Mali         |
| 3            | BF 80-6-4-1-1   | 38 - 3 x IRAT S 10  | Burkina Faso |
| 4            | BF 80-7-7-2-1   | 38 - 3 x 73 - 6/12 - 1 - 2  | Burkina Faso |
| 5            | BF 80-9-8-3-1   | 38 - 3 x 73 - 9/46 - 2 - 1  | Burkina Faso |
| 6            | BF 80-10-23-2-1 | 38 - 3 x 73 - 9/29 - 1 - 1  | Burkina Faso |
| 7            | 82-10-BK-3      | P 96 7083 x SEPON 72  | Niger        |
| 8            | M 24781         | SPV 475 (IS 12611 x SC 108-3) -3-2-7-8-2-2                                      | ICRISAT      |
| 9            | M 24791         | SPV 475 (IS 12611 x SC 108-3) -3-2-2-2  | ICRISAT      |
| 10           | M 24525         | SPV 475 (IS 12611 x SC 108-3) -5-2-2  |              |
| 11           | M 24723         | ((GPR 148 x E 35-1) 16-3 x IS 9327 deriv<br>(2077 B x IS 9327) -7-1-3 - 1-2-5-1 | ICRISAT      |
| 12           | ICSV 1088 BF    | (82-S-96 x CSV - 11) - 14-2   | ICRISAT      |
| 13           | ICSV 1089 BF    | (ICSV 1004 BF x ISVAT 82/Entry 10) - 1 - 2                                      | ICRISAT      |
| 14           | ICSV 1090 BF    | (82 - S - 86 x ISVAT 82/Entry 14) - 1-2   | ICRISAT      |
| 15           | ICSV 1092 BF    | (82 - S - 86 x CSV 4) - 3 - 3   | ICRISAT      |
| 16           | ICSV 1093 BF    | (82 - S - 86 x CSV 4) - 2 - 9   | ICRISAT      |
| 17           | ICSV 1063 BF    | (E 35-1 x Najjadh) x (SC 423 x CS 3541) x E 35-1)                               | ICRISAT      |
| 18           | ICSV 1074 BF    | (SEPON 72 x E 35-1) x CSV 4   | ICRISAT      |
| 19           | ICSH 126 IN     | ((SC 108-3 x Swarne) [35-1) - 6 - 1   | -            |
| 20           | Local control   |   |              |

Table 10. Entry number, variety name, their pedigree, and program of origin of entries in WASVAT medium, 1988.

| Entry No. | Name            | Pedigree   | Contributing Program |
|-----------|-----------------|--|----------------------|
| 1         | S-34            | -  | Cameroon             |
| 2         | Malisor 84-1    | -  | Mali                 |
| 3         | BF 80-6-4-1-1   | 38-3 x IRAT S10  | Burkina Faso         |
| 4         | BF 80-7-7-2-1   | 38-3 x 73-/12-1-2  | Burkina Faso         |
| 5         | BF 80-9-8-3-1   | 38-3 x 73-9/46-2-1   | Burkina Faso         |
| 6         | BF 80-10-23-2-1 | 38-3 x 73-9/29-1-1   | Burkina Faso         |
| 7         | SEPON-82        | P 967083 x SEPON 82  | Niger                |
| 8         | M 24581         | SPV 475 (IS 12611 x SC 108-3)-3-2-7-8-2-2                              | ICRISAT              |
| 9         | M 24791         | SPV 475 (IS 12611 x SC 108-3)-3-2-2-2                                  | ICRISAT              |
| 10        | M 24525         | SPV 475 (IS 12611 x SC 108-3)-5-2-2                                    | ICRISAT              |
| 11        | M 24723         | [GPR 148 x E 35-1) - 16-3 x IS 9327<br>deriv (2077B x IS 9327)-7-1-3)] | ICRISAT              |
| 12        | ICSV 1088 BF    | (82596 x CSV-11)-14-2  | ICRISAT              |
| 13        | ICSV 1089 BF    | (ICSV 1004 BF x ISVAT 82/Entry 10)-1-2                                 | ICRISAT              |
| 14        | ICSV 1090 BF    | (82-S-86 x ISVAT 82/Entry 14)-1-2                                      | ICRISAT              |
| 15        | ICSV 1092 BF    | (82-S-86 x ISV 4)-3-3  | ICRISAT              |
| 16        | ICSV 1093 BF    | (82-S-86 x ISV 4)-2-9  | ICRISAT              |
| 17        | ICSV 1063 BF    | [(E 35-1 xNajjadh) x (ISC 423 x SC 3541) x E 35-                       | ICRISAT              |
| 18        | ICSV 1074 BF    | 1]   | ICRISAT              |
| 19        | ICSV 126 IN     | (SEPON 2 x E 35-1) x ICSV 4  | ICRISAT              |
| 20        | Local Control   | [(SC 108-3 x Swarna) E 35-1]-6-1                                       | National Program     |

Table 11. Entry number, variety name and program of origin of entries in WASVAT medium, 1989 and 1990.

| Entry No. | Variety                | Originating program |
|-----------|------------------------|---------------------|
| 1         | CS 95                  | Cameroon            |
| 2         | CS 85                  | Cameroon            |
| 3         | NSV-1                  | Ghana               |
| 4         | SEPON-82               | Niger               |
| 5         | F2-20                  | Senegal             |
| 6         | Takamalit              | Mauritania          |
| 7         | Niobougou              | Mauritania          |
| 8         | BF 80-10/6-2-3         | Burkina Faso        |
| 9         | BF 82-3/25-1-1         | Burkina Faso        |
| 10        | BF 82-4/4-1-1          | Burkina Faso        |
| 11        | IS 6928                | ICRISAT Reg/Nigeria |
| 12        | IS 23526               | ---                 |
| 13        | IS 22380               | ---                 |
| 14        | ICSV 1163 BF           | ICRISAT Reg/Mali    |
| 15        | ICSV 1157 BF           | ---                 |
| 16        | ICSV 1171 BF           | ---                 |
| 17        | Blanc de Karimama      | Benin               |
| 18        | ICSV 1063 BF (Control) | ICRISAT             |
| 19        | ICSV 1089 BF ( " " )   | ICRISAT             |
| 20        | Local ( " " )          | National Program    |

Table 12. Entry number, variety name and program of origin of entries in WASVAT medium, 1991 and 1992.

| Entry No. | Genotype        | Program of origin |
|-----------|-----------------|-------------------|
| 1         | S 219           | Côte d'Ivoire     |
| 2         | 83-3/3-1-1      | Burkina Faso      |
| 3         | 83-3/48-2-1     | Burkina Faso      |
| 4         | Kadaga          | Ghana             |
| 5         | CSM 388         | Mali              |
| 6         | NR 71158        | Nigeria           |
| 7         | NR 71149        | Nigeria           |
| 8         | Blanc de Bagou  | Benin             |
| 9         | 90 W 187        | ICRISAT           |
| 10        | 90 W 188        | ICRISAT           |
| 11        | 90 W 190        | ICRISAT           |
| 12        | 90 W 191        | ICRISAT           |
| 13        | 90 W 193        | ICRISAT           |
| 14        | 90 W 195        | ICRISAT           |
| 15        | 90 W 196        | ICRISAT           |
| 16        | CS 85 (Control) | Cameroon          |
| 17        | Local (control) |                   |



Table 13. Hybrids, their female and male parents and source of WASHAT, 1987.

| Hybrids                   | Female Parent |   | Male Parent | Source  |
|---------------------------|---------------|---|-------------|---------|
| ICSH 641                  | ICSA-1        | X | MR 904      | ICRISAT |
| ICSH 229                  | ICSA-11       | X | MR 841      | ICRISAT |
| ICSH 230                  | ICSA-11       | X | MR 844      | ICRISAT |
| ICSH 231                  | ICSA-11       | X | MR 860      | ICRISAT |
| ICSH 232                  | ICSA-11       | X | MR 862      | ICRISAT |
| ICSH 401                  | ICSA-11       | X | MR 913      | ICRISAT |
| ICSH 642                  | ICSA-11       | X | MR 927      | ICRISAT |
| ICSH 569                  | ICSA-11       | X | SPL 23 R    | ICRISAT |
| ICSH 233                  | ICSA-11       | X | SPL 59 R    | ICRISAT |
| ICSH 479                  | ICSA-37       | X | MR 922      | ICRISAT |
| ICSH 331                  | ICSA-38       | X | MR 862      | ICRISAT |
| ICSH 643                  | ICSA-38       | X | MR 871      | ICRISAT |
| ICSH 644                  | ICSA-38       | X | MR 877      | ICRISAT |
| ICSH 507                  | ICSA-38       | X | MR 926      | ICRISAT |
| ICSH 526                  | ICSA-38       | X | MR 930      | ICRISAT |
| ICSH 645                  | ICSA-38       | X | MR 941      | ICRISAT |
| ICSH 646                  | ICSA-39       | X | MR 877      | ICRISAT |
| ICSH 336                  | ICSA-40       | X | MR 862      | ICRISAT |
| ICSH 647                  | ICSA-43       | X | MR 875      | ICRISAT |
| ICSH 648                  | ICSA-44       | X | MR 875      | ICRISAT |
| ICSH 109                  | 269 A         | X | MR 844      | ICRISAT |
| Hageen Durra              | ATX 63        | X | Karper 1597 | ICRISAT |
| Framida (local control)   |               |   |             |         |
| Nagawhite (local control) |               |   |             |         |
| Local variety             |               |   |             |         |

Table 14. Hybrids in WASHAT, 1988 and 1989.

WASVAT - 1988

Hybrids

ICSH 230  
 ICSH 231  
 ICSH 232  
 ICSH 780  
 ICSH 527  
 ICSH 88038  
 ICSH 88039  
 ICSH 369  
 ICSH 643  
 ICSH 507  
 ICSH 330  
 ICSH 88040  
 ICSH 88041  
 ICSH 88042  
 ICSH 88043  
 ICSH 336  
 ICSH 88044  
 ICSH 88045

Controls

ICSV 111  
 Local

WASHAT 1989

Hybrids

ICSH 230  
 ICSH 232  
 ICSH 642  
 ICSH 780  
 ICSH 89001 NG  
 ICSH 479  
 ICSH 88038  
 ICSH 88039  
 ICSH 507  
 ICSH 89002 NG  
 ICSH 330  
 ICSH 646  
 ICSH 88042  
 ICSH 89003 NG  
 ICSH 89004 NG  
 Tx 623A x MR 732  
 (INRAN Sorghum Hybrid)  
 Tx 631A x SUCR 36  
 (INRAN Sorghum Hybrid)

Controls

ICSH 109  
 ICSH 111  
 Local

Table 15. Entry number, hybrids and pedigree of entries of WASHAT, 1990.

| Entry | Designation          | Origin/pedigree                       |
|-------|----------------------|---------------------------------------|
| 1     | ICSH 780             | ICSA 11 x MR 908                      |
| 2     | ICSH 89001 NG        | ICSA 11 x ICSV 247                    |
| 3     | ICSH 88038           | ICSA 37 x MR 864                      |
| 4     | ICSH 89005 NG        | ICSA 37 x MR 904                      |
| 5     | ICSH 89006 NG        | ICSA 37 x ICSV 247                    |
| 6     | ICSH 507             | ICSA 38 x MR 926                      |
| 7     | ICSH 89002 NG        | ICSA 38 x ICSV 247                    |
| 8     | ICSH 88007 NG        | ICSA 38 x MR 917                      |
| 9     | ICSH 89008 NG        | ICSA 38 x MR 912                      |
| 10    | ICSH 89009 NG        | ICSA 39 x MR 906                      |
| 11    | ICSH 89010 NG        | ICSA 39 x MR 908                      |
| 12    | ICSH 89011 NG        | ICSA 39 x MR 912                      |
| 13    | ICSH 89012 NG        | ICSA 39 x MR 917                      |
| 14    | ICSH 89013 NG        | ICSA 39 x MR 941                      |
| 15    | ICSH 89004 NG        | ICSA 41 x MR 841                      |
| 16    | ICSH 89014 NG        | ICSA 41 x ICSV 247                    |
| 17    | INRAN Sorghum Hybrid | Tx 623A x MR 732                      |
| 18    | INRAN Sorghum Hybrid | Tx 631A x Suc 36                      |
| 19    | ICSV 111             | Early maturing Variety Control        |
| 20    | Local                | Early Maturing/Variety/Hybrid Control |

Table 16. Entry number, hybrids and pedigree of entries in WASHAT, 1991

| Entry No | Hybrid                 | Originating Pedigree                      |
|----------|------------------------|---|
| 1        | ICSH 90001 NG          | ICSA 2 X ICSV 361                         |
| 2        | ICSH 780               | ICSA 11 X MR 908                          |
| 3        | ICSH 89001 NG          | ICSA 11 X ICSV 247                        |
| 4        | ICSH 89005 NG          | ICSA 37 X MR 904                          |
| 5        | ICSH 90002 NG          | ICSA 37 X MR 861                          |
| 6        | ICSH 90003 NG          | ICSA 37 X MR 912-2                        |
| 7        | ICSH 90004 NG          | ICSA 37 C M 24525                         |
| 8        | ICSH 507               | ICSA 38 X MR 926                          |
| 9        | ICSH 89002 NG          | ICSA 38 X ICSV 247                        |
| 10       | ICSH 89007 NG          | ICSA 38 X MR 917                          |
| 11       | ICSH 9005 NG           | ICSA 38 X M 24525                         |
| 12       | ICSH 89009 NG          | ICSA 39 X MR 906                          |
| 13       | ICSH 89012 NG          | ICSA 39 X MR 917                          |
| 14       | ICSH 89013 NG          | ICSA 39 X MR 941                          |
| 15       | ICSH 90006 NG          | ICSA 39 X M 24791                         |
| 16       | ICSH 89004 NG          | ICSA 41 X MR 841                          |
| 17       | INRAN SORGHUM HYBRID-1 | Tx 623A X MR 732                          |
| 18       | INRAN SORGHUM HYBRID-2 | Tx 613A X Suc 36                          |
| 19       | ICSV 111               | Early Variety Control                     |
| 20       | Local                  | Early Maturing Variety<br>Hybrid Controls |

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Table 17. Entry number and variety name of entries in WASDRN, 1987 and 1988.

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| Entry No | Genotype     |
|----------|--------------|
| 1        | 84 S 22      |
| 2        | 84 S 82      |
| 3        | 84 S 92      |
| 4        | 84 S 103-1   |
| 5        | 84 S 103-2   |
| 6        | 84 S 105-2   |
| 7        | 84 S 109     |
| 8        | 84 S 115     |
| 9        | 84 S 126     |
| 10       | 84 S 130     |
| 11       | 84 S 157     |
| 12       | 84 W 19      |
| 13       | 84 W 838     |
| 14       | 84 W 848     |
| 15       | 84 W 852     |
| 16       | ICSV 2 IN    |
| 17       | ICSV 16-5 BF |
| 18       | ICSV 85-4 BF |
| 19       | ICSV 1002 BF |
| 20       | ICSV 1011 BF |
| 21       | ICSV 1034 BF |
| 22       | IS 956       |
| 23       | IS 3443      |
| 24       | IS 3555      |
| 25       | IS 6991      |
| 26       | IS 9225      |
| 27       | ICSV 1023 BF |
| 28       | IS 9928      |
| 29       | IS 18495     |
| 30       | IS 21629     |
| 31       | IS 21658     |
| 32       | IS 22380     |
| 33       | IS 23526     |
| 34       | ICS 20-1 BF  |
| 35       | 84 S 85      |
| 36       | IS 18696     |

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All entries are from ICRISAT West Africa Program, except the IS lines from ICRISAT germplasm collection.

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Table 18. Entry number and variety name of entries in WASRDN, 1989 and 1990.

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| Entry No. | Genotype     |
|-----------|--------------|
| 1         | 84 S 82      |
| 2         | 84 S 85      |
| 3         | 84 S 103-1   |
| 4         | 84 S 103-2   |
| 5         | 84 S 109     |
| 6         | 84 S 115     |
| 7         | 84 S 126     |
| 8         | 84 S 130     |
| 9         | 84 S 157     |
| 10        | ICSV 1002 BF |
| 11        | 84 W 838     |
| 12        | 84 W 848     |
| 13        | 84 W 852     |
| 14        | ICSV 2 IN    |
| 15        | ICSV 85.BF   |
| 16        | ICSV 1011 BF |
| 17        | ICSV 1023 BF |
| 18        | IS 956       |
| 19        | IS 3443      |
| 20        | IS 3555      |
| 21        | IS 6991      |
| 22        | IS 9225      |
| 23        | ICSV 1034 BF |
| 24        | ICSV 16-5 BF |
| 25        | IS 18696     |

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All genotypes are from ICRISAT breeding programs, except for the IS lines which are from ICRISAT'S germplasm collection.

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Table 19. Entry number and varieties in WASDRN, 1991 and 1992.

| Entry No. | Genotype       |
|-----------|----------------|
| 1         | 48887          |
| 2         | BF 82-7/18-2-1 |
| 3         | ICSV 94-3 BF   |
| 4         | BF 83-3/3-2-2  |
| 5         | BF 58581       |
| 6         | BF 83-3/32-1-1 |
| 7         | E 35-1         |
| 8         | BF 83-3/48-2-1 |
| 9         | BF 83-3/3-1-1  |
| 10        | BF 83-3/52-1-1 |
| 11        | SPV 386        |
| 12        | 84 W 849       |
| 13        | 84 W 966       |
| 14        | F2-20          |
| 15        | 84 S 82        |
| 16        | IS 18442       |
| 17        | IS 13922       |
| 18        | ICSV 745       |

Controls: 84 S 82 = resistant to most leaf diseases. IS 18442, IS 13922, ICSV 745 are susceptible to leaf anthracnose, gray leaf spot, and sooty stripe, respectively.

Table 20. Entry number, variety name, pedigree and source of entries in *Striga* trial - 1988, 1989, 1990.

| Entry | Cultivar              | Pedigree                           | Source           |
|-------|-----------------------|------------------------------------|------------------|
| 1     | ICSV 1078 BF          | (Framida x E 35-1)-4-2-13          | ICRISAT          |
| 2     | ICSV 1079 BF          | (Framida x E 35-1)-4-2-15          | ICRISAT          |
| 3     | ICSV 1007 BF (SRN 39) | CSV x Framida                      | Niger            |
| 4     | ICSV 1098 BF          | (ICSV 1011 BF x ISVAT 82/2022)-3-2 | ICRISAT          |
| 5     | ICSV 1112 BF          | (Framida x E 35-1)-3-7             | ICRISAT          |
| 6     | ICSV 1115 BF          | (Framida x E 35-1)-4-2-37          | ICRISAT          |
| 7     | ICSV 1156 BF          | (ICSV 1011 BF x CSV 4)-2-8         | ICRISAT          |
| 8     | ICSV 1164 BF          |                                    | ICRISAT          |
| 9     | HV 80-10/23-2-1       | -                                  | IRAT/BF          |
| 10    | IS 9830               | Framida                            | ICRISAT          |
| 11    | ICSV 1001 BF          | -                                  | ICRISAT          |
| 12    | Local check           |                                    | National Program |



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Table 21. Entry number and varieties in *Striga* trial, 1991 and 1992.

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| Entry No. | Genotype        |
|-----------|-----------------|
| 1         | CS 54           |
| 2         | IS 15823        |
| 3         | CS-61 X Framida |
| 4         | 82 S 51 X CS 61 |
| 5         | IS 1260         |
| 6         | S 35 X S-34     |
| 7         | CS 54 X CS 63   |
| 8         | CS 95           |
| 9         | CS 54 X Djigari |
| 10        | S 35            |
| 11        | CS 210          |
| 12        | CS 141          |
| 13        | Local (control) |

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1. All entries were submitted by the WCASRN's *Striga* Projecti in Cameroon as per recommendation of the Steering Committee.
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Table 22. Number of sets of regional trials dispatched and number of results received by country in 1986.

| Country                | Trials and number of sets |        |               |          |        |
|------------------------|---------------------------|--------|---------------|----------|--------|
|                        | WASVAT                    |        | <i>Striga</i> | Diseases | WASHAT |
|                        | Early                     | Medium |               |          |        |
| Benin                  | 0                         | 0      | 0             | 0        | 0      |
| Burkina Faso           | 3 R(3)                    | 4 R(4) | 0             | 0        | 6 R(5) |
| Cameroon               | 1 R                       | 1 R    | 0             | 0        | 2 R(2) |
| CAR                    | 0                         | 0      | 0             | 0        | 0      |
| Côte d'Ivoire          | 0                         | 0      | 0             | 0        | 2 R(2) |
| Gambia                 | 1 R                       | 1 R    | 0             | 0        | 0      |
| Ghana                  | 1 R                       | 1 R    | 0             | 0        | 1 R    |
| Guinea                 | 0                         | 0      | 0             | 0        | 0      |
| Guinea Bissau          | 0                         | 0      | 0             | 0        | 0      |
| Mali                   | 0                         | 0      | 0             | 0        | 0      |
| Mauritania             | 0                         | 0      | 0             | 0        | 0      |
| Niger                  | 0                         | 0      | 0             | 0        | 0      |
| Nigeria                | 0                         | 0      | 0             | 0        | 0      |
| Senegal                | 0                         | 0      | 0             | 0        | 0      |
| Sierra Leone           | 0                         | 0      | 0             | 0        | 0      |
| Tchad                  | 0                         | 0      | 0             | 0        | 0      |
| Togo                   | 1 R                       | 1 R    | 0             | 0        | 2 R(2) |
| TOTAL DISPATCHED       | 7                         | 8      |               |          | 14     |
| TOTAL RESULTS RECEIVED | 7                         | 8      |               |          | 12     |

WASVAT = West African Sorghum Variety Adaptation Trial. Early and medium refer to maturity cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. Disease nursery started in 1987 and *Striga* trial started in 1988. R = Results received, with number in parenthesis.

Table 23. Number of sets of regional trials dispatched and number of results received by country in 1987.

| Country                | Trials and number of sets |        |               |          |        |
|------------------------|---------------------------|--------|---------------|----------|--------|
|                        | WASVAT                    |        | <i>Striga</i> | Diseases | WASHAT |
|                        | Early                     | Medium |               |          |        |
| Benin                  | 0                         | 1 R    | 0             | 0        | 0      |
| Burkina Faso           | 5 R(5)                    | 5 R(5) | 0             | 2 R(2)   | 7 R(7) |
| Cameroon               | 1 R                       | 0      | 0             | 0        | 2 R(2) |
| CAR                    | 0                         | 0      | 0             | 0        | 0      |
| Côte d'Ivoire          | 0                         | 1 R    | 0             | 1 R      | 2 R(2) |
| Gambia                 | 1 R                       | 1 R    | 0             | 0        | 0      |
| Ghana                  | 0                         | 1 R    | 0             | 0        | 1 R    |
| Guinea                 | 0                         | 0      | 0             | 0        | 0      |
| Guinea Bissau          | 0                         | 0      | 0             | 0        | 0      |
| Mali                   | 1 R                       | 1 R    | 0             | 1 R      | 1 R    |
| Mauritania             | 0                         | 0      | 0             | 0        | 0      |
| Niger                  | 1                         | 1      | 0             | 1 R      | 1 R    |
| Nigeria                | 1 R                       | 1 R    | 0             | 0        | 0      |
| Senegal                | 0                         | 0      | 0             | 0        | 0      |
| Sierra Leone           | 0                         | 0      | 0             | 0        | 0      |
| Tchad                  | 0                         | 0      | 0             | 0        | 0      |
| Togo                   | 0                         | 1 R    | 0             | 0        | 1 R    |
| TOTAL DISPATCHED       | 10                        | 13     | 0             | 5        | 15     |
| TOTAL RESULTS RECEIVED | 9                         | 12     |               | 5        | 15     |

WASVAT = West African Sorghum Variety Adaptation Trial. Early and medium refer to maturity cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. Disease nursery started in 1987 and *Striga* trial started in 1988. R = Results received, with number in parenthesis.

Table 24. Number of sets of regional trials dispatched and number of results received by country in 1988.

| Country                | Trials and number of sets |        |               |          |        |
|------------------------|---------------------------|--------|---------------|----------|--------|
|                        | WASVAT                    |        | <i>Striga</i> | Diseases | WASHAT |
|                        | Early                     | Medium |               |          |        |
| Benin                  | 0                         | 1 R    | 0             | 0        | 0      |
| Burkina Faso           | 2 R(2)                    | 2 R(2) | 0             | 2 R      | 1 R    |
| Cameroon               | 1 R                       | 1 R    | 1 R           | 0        | 0      |
| CAR                    | 0                         | 1      | 0             | 0        | 0      |
| Côte d'Ivoire          | 0                         | 1 R    | 0             | 1 R      | 2 R    |
| Gambia                 | 1                         | 1      | 0             | 0        | 0      |
| Ghana                  | 1 R                       | 1 R    | 1 R           | 1 R      | 1 R    |
| Guinea                 | 0                         | 1      | 0             | 0        | 0      |
| Guinea Bissau          | 0                         | 1      | 0             | 0        | 0      |
| Mali                   | 2 R(2)                    | 2 R(2) | 1 R           | 1 R      | 2 R    |
| Mauritania             | 1 R                       | 0      | 0             | 0        | 0      |
| Niger                  | 2 R(2)                    | 2 R(2) | 1             | 1 R      | 3 R(3) |
| Nigeria                | 2 R(2)                    | 2 R(2) | 1             | 1 R      | 2 R(2) |
| Senegal                | 1 R                       | 0      | 0             | 0        | 0      |
| Sierra Leone           | 0                         | 1      | 0             | 0        | 0      |
| Tchad                  | 1                         | 1      | 0             | 0        | 0      |
| Togo                   | 0                         | 1 R    | 1             | 0        | 1 R    |
| TOTAL DISPATCHED       | 14                        | 19     | 6             | 7        | 12     |
| TOTAL RESULTS RECEIVED | 12                        | 13     |               | 7        | 12     |

WASVAT = West African Sorghum Variety Adaptation Trial. Early and medium refer to maturity cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. Disease nursery started in 1987 and *Striga* trial started in 1988. R = Results received, with number in parenthesis.

Table 25. Number of sets of regional trials dispatched and number of results received by country in 1989.

| Country                | Trials and number of sets |        |               |          |        |
|------------------------|---------------------------|--------|---------------|----------|--------|
|                        | WASVAT                    |        | <i>Striga</i> | Diseases | WASHAT |
|                        | Early                     | Medium |               |          |        |
| Benin                  | 0                         | 1 R    | 1             | 0        | 0      |
| Burkina Faso           | 2 R(2)                    | 2 R(2) | 1 R           | 2 R(1)   | 1 R    |
| Cameroon               | 1 R                       | 1 R    | 1 R           | 1        | 1 R    |
| CAR                    | 0                         | 1      | 0             | 1        | 0      |
| Côte d'Ivoire          | 0                         | 1      | 0             | 0        | 1 R    |
| Gambia                 | 1                         | 1      | 0             | 0        | 0      |
| Ghana                  | 2 R(2)                    | 2 R(2) | 1 R           | 1        | 0      |
| Guinea                 | 0                         | 1      | 0             | 1        | 0      |
| Guinea Bissau          | 0                         | 1      | 1             | 1        | 0      |
| Mali                   | 2 R(2)                    | 2 R(2) | 1 R           | 1 R      | 2 R(2) |
| Mauritania             | 1                         | 0      | 0             | 0        | 0      |
| Niger                  | 2 R(2)                    | 1 R    | 0             | 1        | 2 R(2) |
| Nigeria                | 1 R                       | 1 R    | 1 R           | 0        | 2 R(1) |
| Senegal                | 1 R                       | 1 R    | 0             | 0        | 0      |
| Sierra Leone           | 1 R                       | 1 R    | 0             | 1        | 0      |
| Tchad                  | 1                         | 1      | 1             | 0        | 0      |
| Togo                   | 1                         | 1 R    | 1 R           | 0        | 0      |
| TOTAL DISPATCHED       | 16                        | 19     | 9             | 10       | 9      |
| TOTAL RESULTS RECEIVED | 12                        | 13     | 6             | 2        | 8      |

WASVAT = West African Sorghum Variety Adaptation Trial. Early and medium refer to maturity cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. Disease nursery started in 1987 and *Striga* trial started in 1988. R = Results received, with number in parenthesis.

Table 26. Number of sets of regional trials dispatched and number of results received by country in 1990.

| Country                | Trials and number of sets |        |               |          |        |
|------------------------|---------------------------|--------|---------------|----------|--------|
|                        | WASVAT                    |        | <i>Striga</i> | Diseases | WASHAT |
|                        | Early                     | Medium |               |          |        |
| Benin                  | 0                         | 1      | 1             | 0        | 0      |
| Burkina Faso           | 2 R(2)                    | 2 R(2) | 0             | 1 R      | 0      |
| Cameroon               | 1 R                       | 1 R    | 1 R           | 1        | 2 R(2) |
| CAR                    | 0                         | 1      | 0             | 0        | 0      |
| Côte d'Ivoire          | 0                         | 1 R    | 0             | 0        | 2 R(2) |
| Gambia                 | 1 R                       | 1 R    | 0             | 0        | 0      |
| Ghana                  | 1 R                       | 2 (1)  | 1             | 1        | 0      |
| Guinea                 | 0                         | 1 R    | 0             | 1 R      | 0      |
| Guinea Bissau          | 0                         | 1      | 1             | 1        | 0      |
| Mali                   | 2 R(2)                    | 2 R(2) | 1             | 2 R(1)   | 3 R(3) |
| Mauritania             | 1 R                       | 0      | 0             | 0        | 0      |
| Niger                  | 1 R                       | 1 R    | 1 R           | 1 R      | 2 R(2) |
| Nigeria                | 2                         | 2      | 4             | 0        | 1 R    |
| Senegal                | 1 R                       | 1 R    | 0             | 0        | 0      |
| Sierra Leone           | 1 R                       | 1 R    | 0             | 0        | 0      |
| Tchad                  | 1 R                       | 1 R    | 0             | 0        | 0      |
| Togo                   | 1 R                       | 0      | 1 R           | 0        | 0      |
| TOTAL DISPATCHED       | 15                        | 19     | 11            | 8        | 10     |
| TOTAL RESULTS RECEIVED | 13                        | 13     | 3             | 4        | 10     |

WASVAT = West African Sorghum Variety Adaptation Trial. Early and medium refer to maturity cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. Disease nursery started in 1987 and *Striga* trial started in 1988. R = Results received, with number in parenthesis.

Table 27. Number of sets of regional trials dispatched and number of results received by country in 1991.

| Country                | Trials and number of sets <sup>1</sup> |         |               |          |         |
|------------------------|--|---------|---------------|----------|---------|
|                        | WASVAT                                 |         | <i>Striga</i> | Diseases | WASHAT  |
|                        | Early                                  | Medium  |               |          |         |
| Benin                  | 0                                      | 1 R (1) | 0             | 0        | 1 R (1) |
| Burkina Faso           | 2 R (2)                                | 2 R (2) | 0             | 1 R (1)  | 1 R (1) |
| Cameroon               | 1 R (1)                                | 1 R (1) | 1 R (1)       | 1        | 2 R (1) |
| CAR                    | 0                                      | 1       | 0             | 0        | 0       |
| Côte d'Ivoire          | 0                                      | 1       | 0             | 0        | 2 R (2) |
| Gambia                 | 1 R                                    | 0       | 1             | 0        | 0       |
| Ghana                  | 1 R (1)                                | 2 R (1) | 0             | 1 R (1)  | 1 R (1) |
| Guinea                 | 0                                      | 1 R (1) | 0             | 1        | 0       |
| Guinea Bissau          | 0                                      | 1       | 0             | 1        | 0       |
| Mali                   | 2 R (2)                                | 2 R (2) | 1 R (1)       | 2 R (1)  | 2 R (2) |
| Mauritania             | 1 R (1)                                | 0       | 0             | 0        | 0       |
| Niger                  | 1 R (1)                                | 1 R (1) | 1             | 1        | 2 R (2) |
| Nigeria <sup>2</sup>   | 2 R (1)                                | 2 R (2) | 0             | 0        | 2 R (2) |
| Senegal                | 1 R (1)                                | 1 R (1) | 1 R (1)       | 0        | 1 R (1) |
| Sierra Leone           | 1 R (1)                                | 1 R (2) | 0             | 1 R (1)  | 0       |
| Tchad                  | 1 R (1)                                | 1       | 1             | 0        | 0       |
| Togo                   | 1 R                                    | 0       | 1             | 0        | 0       |
| TOTAL DISPATCHED       | 15                                     | 18      | 7             | 9        | 14      |
| TOTAL RESULTS RECEIVED | 11                                     | 13      | 3             | 4        | 13      |

1. WASVAT = West African Sorghum Variety Adaptation Trial. Early and medium refer to maturity cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. Disease nursery started in 1987 and *Striga* trial started in 1988. R = Results received, with number in parenthesis.

2. Results from WASVAT early and medium from Nigeria were not analyzed.

Table 28. Percent response (results received) from NARS of regional trials, 1986 to 1991).

| Year | Trial <sup>1</sup> | Dispatched | Results received    |            |
|------|--------------------|------------|---------------------|------------|
|      |                    |            | Number <sup>2</sup> | Percentage |
| 1986 | WASVAT-E           | 7          | 7                   | 100        |
|      | WASVAT-M           | 8          | 8                   | 100        |
|      | WASHAT             | 14         | 12                  | 86         |
| 1987 | WASVAT-E           | 10         | 9                   | 90         |
|      | WASVAT-M           | 13         | 12                  | 92         |
|      | WASHAT             | 15         | 15                  | 100        |
|      | WASLDN             | 5          | 5                   | 100        |
| 1988 | WASVAT-E           | 14         | 12                  | 86         |
|      | WASVAT-M           | 19         | 13                  | 68         |
|      | WASHAT             | 12         | 12                  | 100        |
|      | WASLDN             | 7          | 7                   | 100        |
|      | WCASST             | 6          | 3                   | 50         |
| 1989 | WASVAT-E           | 16         | 12                  | 75         |
|      | WASVAT-M           | 19         | 13                  | 68         |
|      | WASHAT             | 9          | 8                   | 89         |
|      | WASLDN             | 10         | 2                   | 20         |
|      | WCASST             | 9          | 6                   | 67         |
| 1990 | WASVAT-E           | 15         | 13                  | 87         |
|      | WASVAT-M           | 19         | 13                  | 68         |
|      | WASHAT             | 10         | 10                  | 100        |
|      | WASDLN             | 8          | 4                   | 50         |
|      | WCASST             | 11         | 3                   | 27         |
| 1991 | WASVAT-E           | 15         | 11                  | 80         |
|      | WASVAT-M           | 18         | 13                  | 77         |
|      | WASHAT             | 14         | 13                  | 93         |
|      | WASLDN             | 9          | 4                   | 55         |
|      | WCASST             | 7          | 3                   | 43         |

1. WASVAT-E = West African Sorghum Variety Adaptation Trial, Early Maturing Cycle. M= Medium cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. WASLDN = West African Sorghum Leaf Disease Nursery. WCASST = West and Central Africa Sorghum *Striga* Trial.



Table 29. Percentage of varieties contributed by NARS to the regional trials, 1986 to 1992.

| Year              | Trial <sup>1</sup> | Total number<br>of test<br>entries | Test entries<br>from NARS |         |
|-------------------|--------------------|------------------------------------|---------------------------|---------|
|                   |                    |                                    | Number <sup>2</sup>       | Percent |
| 1986              | WASVAT-E           | 18                                 | 0                         | 0       |
|                   | WASVAT-M           | 18                                 | 0                         | 0       |
|                   | WASHAT             | 30                                 | 0                         | 0       |
| 1987              | WASVAT-E           | 18                                 | 6                         | 33      |
|                   | WASVAT-M           | 18                                 | 7                         | 39      |
|                   | WASHAT             | 22                                 | 0                         | 0       |
|                   | WASLDN             | 36                                 | 0                         | 0       |
| 1988              | WASVAT-E           | 18                                 | 5                         | 28      |
|                   | WASVAT-M           | 18                                 | 7                         | 39      |
|                   | WASHAT             | 18                                 | 0                         | 0       |
|                   | WASLDN             | 36                                 | 0                         | 0       |
|                   | WCASST             | 11                                 | 1                         | 9       |
| 1989              | WASVAT-E           | 17                                 | 6                         | 35      |
|                   | WASVAT-M           | 17                                 | 10                        | 59      |
|                   | WASHAT             | 17                                 | 2                         | 12      |
|                   | WASLDN             | 25                                 | 0                         | 0       |
|                   | WCASST             | 11                                 | 1                         | 9       |
| 1990              | WASVAT-E           | 17                                 | 6                         | 35      |
|                   | WASVAT-M           | 17                                 | 10                        | 59      |
|                   | WASHAT             | 18                                 | 2                         | 11      |
|                   | WASLDN             | 25                                 | 0                         | 0       |
|                   | WCASST             | 11                                 | 1                         | 9       |
| 1991              | WASVAT-E           | 11                                 | 8                         | 73      |
|                   | WASVAT-M           | 15                                 | 8                         | 53      |
|                   | WASHAT             | -                                  | -                         | -       |
|                   | WASLDN             | 14                                 | 6                         | 43      |
|                   | WCASST             | 12                                 | 12                        | 100     |
| 1992 <sup>3</sup> |                    |                                    |                           |         |

1. WASVAT-E = West African Sorghum Variety Adaptation Trial, Early Maturing Cycle. M= Medium cycle. WASHAT = West African Sorghum Hybrid Adaptation Trial. WASLDN = West African Sorghum Leaf Disease Nursery. WCASST = West and Central Africa Sorghum Striga Trial.
2. Rest of test entries contributed by ICRISAT. 3. As in 1991
3. As in 1991.

Table 30. Details on participation of NARS in three short-term training program between 1987 and 1991.

| Type                        | Location    | Year | Date      | N° of days | Participants |                              |
|-----------------------------|-------------|------|-----------|------------|--------------|------------------------------|
|                             |             |      |           |            | Number       | No of countries <sup>1</sup> |
| 1. <i>Striga</i> Control    | Ouagadougou | 1987 | 5-10 Oct  | 6          | 12           | 11                           |
| 2. Agronomy/on-Farm Testing | Bamako      | 1989 | 9-29 Sept | 21         | 9            | 9                            |
| 3. Plant Protection         | Bamako      | 1991 | 3-12 Oct  | 10         | 3            | 3                            |

1. For *Striga*: Burkina Faso, Cameroon, Gambia, Ghana, Kenya, Mali, Niger, Nigeria, Sudan, Togo, Uganda.

For Agronomy: Côte d'Ivoire, Gambia, Ghana, Guinea Bissau, Mauritania, Niger, Nigeria, Senegal, Sierra Leone.

For Plant Protection: Tchad, Côte d'Ivoire, Senegal on *Striga*, entomology and Pathology, respectively.

Table 31. Details on participation of NARS in two regional workshops held in 1988 and 1991.

| Location <sup>1</sup> | Year | Date       | No of days | Participants |                 |
|-----------------------|------|------------|------------|--------------|-----------------|
|                       |      |            |            | Number       | No of countries |
| Cameroon              | 1988 | 20-23 Nov  | 4          | 52           | 14              |
| Niamey                | 1991 | 7-14 March | 8          | 20           | 16              |

1. Cameroon and Nigeria were the third and fourth workshops. The first and second workshops in 1984 and 1985, fall outside the period under review.

Table 32. Details on participation of NARS in five monitoring tours between 1986 and 1991.

| Countries visited                           | Year | Date          | No of days | Participants <sup>1</sup> |                  |
|---|------|---------------|------------|---------------------------|------------------|
|   |      |               |            | Number                    | No. of countries |
| 1. Cameroon<br>Gambia<br>Nigeria<br>Senegal | 1986 | 23 Sept-6 Oct | 14         | 6                         | 6                |
| 2. Burkina Faso                             | 1986 | 3-16 Oct      | 4          | 5                         | 5                |
| 3. Burkina Faso                             | 1987 | 30 Sept-3 Oct | 4          | 11                        | 11               |
| 4. Mali<br>Burkina Faso<br>Niger            | 1988 | 9-18 Oct      | 10         | 7                         | 7                |
| 5. Mali                                     | 1991 | 10-12 Oct     | 3          | 3                         | 3                |

1. 1986 (1) : Benin, Central African Republic, Gambia, Mauritania, Nigeria, Senegal.  
 1986 (2) : Ghana, Guinea Bissau, Mali, Niger, Sierra Leone.  
 1987 : Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Gambia, Niger, Nigeria, Senegal, Togo, Mali.  
 1988 : Benin, Burkina Faso, Cameroon, Guinea, Mali, Chad, Togo.  
 1991 : Niger, Nigeria, Tchad.

Table 33. Details on members of the steering committee who assisted in visiting non-lead NARS.

| Made by Country <sup>1</sup> | Countries visited | Year | Date      | No of days |
|------------------------------|-------------------|------|-----------|------------|
| Mali                         | Senegal<br>Gambia | 1989 | 5/9-16/9  | 8          |
| Nigeria                      | Ghana             | 1990 | 18/8-27/8 | 10         |
| Burkina Faso                 | Benin             | 1990 | 28/9-6/10 | 10         |

1. Countries of the Steering Committee members who assisted the Coordinator in visiting the weaker NARS.

Table 34. Details on participation of NARS in four working group meetings on research projects.

| Working group           | Location       | Year | Date        | Number of days | Participants from NARS <sup>1</sup> |
|-------------------------|----------------|------|-------------|----------------|-------------------------------------|
| 1. Pathology-Entomology | Bamako, Mali   | 1990 | 19-20 April | 2              | 5                                   |
| 2. Grain Utilization    | Zaria, Nigeria | 1990 | 13 Sept     | 1              | 4                                   |
| 3. <i>Striga</i>        | Niamey, Niger  | 1991 | 10 March    | 1              | 5                                   |
| 4. All projects         | Bamako, Mali   | 1992 | 9-10 March  | 2              | 11                                  |

1. Participants from NARS were either the principal investigator(s) of the research projects or individuals invited as evaluators. The principal investigators of the projects on anthracnose (Burkina Faso) and grain quality (Niger) were absent in 1992.

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Table 35. Details on participation of NARS in a special meeting on *Striga*.

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|                         |   |
|-------------------------|---|
| Location:               | Bamako  |
| Date:                   | 10-11 March, 1992                                     |
| Number of days:         | 2   |
| Participants from NARS: | 3   |
| Objective:              | Discuss results and develop a common research agenda. |
| Observers:              | FAO, PASCON, SAFGRAD, ICRISAT, IRAT/CIRAD.            |

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Table 36 Location, date, number of days and number of participants from NARS of WECASORN's steering committee meetings.

| Location                      | Year | Date        | No of days | Participants from NARS as |                       |
|-------------------------------|------|-------------|------------|---------------------------|-----------------------|
|                               |      |             |            | Member <sup>1</sup>       | Observer <sup>2</sup> |
| 1. Ouagadougou, Burkina Faso  | 1986 | 13-14 Jan   | 2          | 2                         | 1                     |
| 2. Ouagadougou, Burkina Faso  | 1987 | 10-11 March | 2          | 3                         | 1                     |
| 3. Ouagadougou, Burkina Faso  | 1987 | 15-17 Dec   | 3          | 4*                        | 1                     |
| 4. Maroua, Cameroon           | 1988 | 24 Sept     | 1          | 6*                        | 2                     |
| 5. Bamako, Mali               | 1989 | 9-11 May    | 3          | 4*                        | 0                     |
| 6. Ouagadougou, Burkina Faso  | 1989 | 14-17 Nov   | 4          | 5*                        | 1                     |
| 7. Niamey, Niger              | 1990 | 2-4 May     | 3          | 6*                        | 1                     |
| 8. Bamako, Mali               | 1990 | 3-4 Dec     | 2          | 3*                        | 0                     |
| 9. Niamey, Niger              | 1991 | 13-14 March | 2          | 5                         | 0                     |
| 10. Ouagadougou, Burkina Faso | 1991 | 12-14 Nov   | 3          | 5                         | 1                     |
| 11. Bamako, Mali              | 1992 | 8-9 June    | 2          | 6                         | 7                     |

1. An asterik indicates members includes individuals from outside the region, but with NARS on special projects as follows: 1987 = 1; 1988 = 3; 1989, May = 2; 1989, Nov = 2; 1990, May = 2; 1990, Dec = 1.
2. Observers = individuals from NARS. Observers from International and regional organizations not included.



Table 37. Significant results on a yearly basis from WECASORN's research projects.

| Project        | Country      | Year Project started | Significant results |         |  |
|----------------|--------------|----------------------|---------------------|---------|--|
|                |              |                      | Cropping season     | Results |  |
| 1. Anthracnose | Burkina Faso | 1989                 | 1989                | 1.      | Identified 74 out of 80 lines screened as resistant to foliar infection.   |
|                |              |                      |                     | 2.      | Grain of 30 lines were free of the fungus. Grain contamination was higher in introduced varieties.                 |
|                |              |                      | 1990                | 1.      | The resistance to foliar infection observed in 1989 was confirmed in 70 lines.                                     |
|                |              |                      |                     | 2.      | A total of 44 lines, all local varieties, were resistant to leaf, stem and grain infection.                        |
| 2. Long smut   | Niger        | 1990                 | 1990                | 1.      | Eleven out of 75 varieties screened were highly resistant.   |
|                |              |                      |                     | 2.      | Late maturing varieties were more susceptible.   |
|                |              |                      | 1991                | 1.      | Identified 19 local varieties and three introduced varieties with rate reducing-like resistance to leaf infection. |
|                |              |                      |                     | 3.      | Disease progress more rapid in introduced varieties.   |

Table 37 continued.

| Project      | Country | Year project started | Significant results |   |
|--------------|---------|----------------------|---------------------|---|
|              |         |                      | Cropping season     | Results   |
|              |         |                      | 1991                | <ol style="list-style-type: none"> <li>1. New sets of 24 varieties identified as resistant at two locations.</li> <li>2. Longevity of teliospores of the long smut fungus was increased when stored dry.</li> <li>3. Infection was higher when plants were ino-culated with sporidia than with teliospores</li> </ol> |
| 3. Head bugs | Mali    | 1989                 | 1989                | <ol style="list-style-type: none"> <li>1. Population of the head bug insect was high at the end of September and October.</li> <li>2. Early planting resulted in no attack, whereas two generations developed in late planted sorghums.</li> <li>3. Twenty-five out of 100 lines were resistant.</li> </ol>           |
|              |         |                      | 1990                | Results obtained in 1989 were confirmed.  |
|              |         |                      | 1991                | <ol style="list-style-type: none"> <li>1. Identified 21 new sources of resistance out of 51 lines screened in a preliminary nursery.</li> <li>2. The resistance of nine varieties identified in 1989 and 1990 were confirmed by artificial inoculation.</li> </ol>  |

Table 37 continued.

| Project                             | Country  | Year project started | Significant results |  |
|-------------------------------------|----------|----------------------|---------------------|--|
|                                     |          |                      | Cropping season     | Results  |
| 4. <i>Striga</i>                    | Cameroon | 1990                 | 1990                | The project multiplied eight varieties and two germplasm lines resistant to <i>Striga</i> , for entries in regional <i>Striga</i> trial.   |
|                                     |          |                      | 1991                | <ol style="list-style-type: none"> <li>1. Fourteen lines with low <i>Striga</i> counts identified.</li> <li>2. All 12 entries in the <i>Striga</i> regional trial came from the project.</li> </ol>  |
| 5. Wheat-sorghum flour <sup>a</sup> | Nigeria  | 1989                 |                     | <ol style="list-style-type: none"> <li>1. Local Farafara variety identified as most suitable sorghum variety for the composite flour.</li> <li>2. Upto to 50% substitution of sorghum for bread and upto 60% for confectionery.</li> <li>3. Addition of 0.5% Cassava starch flour to the composite flour produced more spongy bread, closer textured and less crumbling, but shelf life was shortened.</li> <li>4. Wheat-sorghum composite flour bread more popular among low income group because it was more filling than pure wheat bread.</li> </ol> |

a. Work was not carried out according to cropping season.

Table 38. The top four yielding varieties and hybrids in the regional trials of WECASORN, 1986 to 1991.

| WASVAT-Early      |                    | WASVAT-Medium  |                    | WASHAT        |                    |
|-------------------|--------------------|----------------|--------------------|---------------|--------------------|
| Variety           | t ha <sup>-1</sup> | Variety        | t ha <sup>-1</sup> | Hybrid        | t ha <sup>-1</sup> |
| 1986              |                    |                |                    |               |                    |
| ICSV 1078 BF      | 3.66               | ICSV 1063 BF   | 2.55               | ICSH 230      | 3.36               |
| ICSV 1054 BF      | 3.52               | IS 915         | 2.40               | ICSH 229      | 3.34               |
| ICSV 1055 BF      | 3.37               | ICSV 1074 BF   | 2.37               | ICSH 208      | 3.26               |
| ICSV 1065 BF      | 3.28               | PM 11344       | 2.35               | ICSH 134      | 3.24               |
| 1987              |                    |                |                    |               |                    |
| Nagawhite         | 2.80               | ICSV 1063 BF   | 2.58               | ICSH 336      | 2.80               |
| ICSV 111 IN       | 2.57               | ICSV 1089 BF   | 2.56               | ICSH 232      | 2.75               |
| ICSV 1083 BF      | 2.50               | M 24581        | 2.48               | ICSH 643      | 2.72               |
| CE 180-33         | 2.38               | Malisor 84-1   | 2.48               | ICSH 642      | 2.64               |
| 1988              |                    |                |                    |               |                    |
| Nagawhite         | 3.53               | ICSV 1063 BF   | 3.34               | ICSH 507      | 3.32               |
| ICSV 210 IN       | 3.41               | Malisor 84-1   | 3.08               | ICSH 330      | 3.09               |
| ICSV 111 IN       | 3.27               | ICSV 1089 BF   | 3.01               | ICSH 88042    | 3.03               |
| S-35              | 3.23               | BF 80-7-7-2-1  | 2.97               | ICSH 88040    | 2.92               |
| 1989              |                    |                |                    |               |                    |
| ICSV 1079 BF      | 2.74               | ICSV 1171 BF   | 2.37               | ICSH 507      | 3.66               |
| CS 61             | 2.65               | F2-20          | 2.34               | ICSH 780      | 3.60               |
| ICSV 111 IN       | 2.55               | CS-95          | 2.32               | TX623XMR 732  | 3.58               |
| ICSV 1172 BF      | 2.47               | ICSV 1089 BF   | 2.29               | ICSH 89002    | 3.57               |
| 1990              |                    |                |                    |               |                    |
| CE 196-7-2-1      | 2.53               | CS 85          | 2.09               | ICSH 89002    | 3.71               |
| ICSV 1174 BF      | 2.26               | SEPON 82       | 1.96               | ICSH 89008    | 3.68               |
| ICSV 401 IN       | 2.22               | F2-20          | 1.94               | IS 6928       | 3.56               |
| ICSV 1172 BF      | 2.14               | IS 6928        | 1.90               | ICSH 89007    | 3.54               |
| 1991              |                    |                |                    |               |                    |
| 90 W 186          | 2.47               | S 219          | 2.33               | ICSH 89009 NG | 3.65               |
| SSV-2             | 2.37               | BF 83-3/3-1-1  | 2.25               | ICSH 780      | 3.53               |
| CE 145-66 TRANS 2 | 2.26               | BF 83-3/42-2-1 | 2.10               | ICSH 950005   | 3.44               |
| CE 314-18         | 2.08               | Kadaga         | 2.09               | ICSH 507      | 3.41               |

1. Values in t ha<sup>-1</sup> are means from several locations. Prefixes: all ICSV, IS, PM and ICSH are from ICRISAT; nagawhite from Ghana; CE and F2 from Senegal; CS and S from Cameroon; Malisor from Mali; BF from Burkina Faso; Sepon and Tx from Niger.

Table 39. Resistant or moderately resistant to leaf anthracnose and gray leaf spot tested in the West African Sorghum Disease Resistant Nursery between 1988 and 1991.

| Leaf anthracnose | Gray leaf spot |
|------------------|----------------|
| 1987 and 1988    |                |
| IS 9928          | IS 9928        |
| IS 21658         | IS 22380       |
| 84 S 82          |                |
| 1989 and 1990    |                |
| IS 9225*         | 84 W 852       |
| 84 S 109         | ICSV 1002 BF   |
| IS 956*          | ICSV 85 BF     |
| IS 3443          | ICSV 2 IN      |
| ICSV 1023 BF*    | 84 S 85        |
| IS 3555*         | 84 W 848       |
| IS 6991*         | 84 S 103-2     |
| ICSV 1034 BF*    | 84 S 115       |
| 84 W 838*        | 84 S 130       |
| 84 S 157*        | 84 S 130-1     |
| 84 S 126*        | ICSV 1011 BF   |
| 1991             |                |
| F2-20*           | BF 82-7/18-2-1 |
|                  | 58581          |
|                  | BF 83-3/3-2-2  |
|                  | BF 83-3/32-1-1 |
|                  | E 35-1         |
|                  | BF 83-3/48-2-1 |
|                  | BF 83-3/3-1-1  |
|                  | BF 83-3/52-1-1 |
|                  | SPV 386        |
|                  | 84 W 849       |
|                  | 84 W 966       |

1. Resistant = mean disease severity score for several locations (MDSL)  $\leq$  3.0, and moderately resistant = MDSL of 3.5 on a scale of 1-6. Sooty stripe incidence and severity were very low in most locations. An asterik indicates that the variety is also resistant or moderately resistant to gray leaf spot.

Table 40. Promising varieties with relatively low *Striga* counts in the West Africa Sorghum *Striga* trial between 1988 and 1991.

| 1988         | 1989                      | 1990         | 1991            |
|--------------|---------------------------|--------------|-----------------|
| IS 9830      | ICSV 1001 BF <sup>1</sup> | ICSV 1001 BF | CS 54 X Djigari |
| ICSV 1007 BF | ICSV 1007 BF              | ICSV 1078 BF | CS 141          |
|              | ICSV 1164 BF              | ICSV 1098 BF | CS 95           |
|              | IS 9830                   | ICSV 1115 BF | CS 54           |
|              |                           | ICSV 1112 BF | IS 15823        |
|              |                           | ICSV 1079 BF | S 35            |
|              |                           |              | IS 1260         |

1. ICSV 1001 BF is Framida.

Table 41. Thirty-five varieties tested in the regional trials and nurseries of WECASORN between 1986 and 1992 that are at various levels in the research programs of seven NARS<sup>1</sup>.

| From NARS                  |                   |                   | From ICRISAT              |                   |
|----------------------------|-------------------|-------------------|---------------------------|-------------------|
| Variety                    | Country of origin | used by (country) | Variety                   | used by (country) |
| 1. CSM 388                 | Mali              | GC                | 1. ICSV 16-5 BF           | GC, GH            |
| 2. Malisor 84-1            | Mali              | GC, CI, TO        | 2. 84 W 848               | GC                |
| 3. Malisor 84-5            | Mali              | GC                | 3. IS 3443                | GC                |
| 4. BF 83-3/48-2-1          | Burkina Faso      | GC                | 4. Framida (ICSV 1001 BF) | GC, CI, TO        |
| 5. F2-20                   | Senegal           | SE                | 5. 90 W 190               | GC                |
| 6. CE 180-83               | Senegal           | SE, TO            | 6. ICSV 1171 BF           | SE                |
| 7. CE 196-7-2-1            | Senegal           | SE                | 7. ICSV 1089 BF           | SE, MA, TO        |
| 8. CS 95                   | Cameroon          | SE, TO            | 8. ICSV 1163 BF           | SE                |
| 9. SEPON 82                | Niger             | SE, TO            | 9. ICSV 111 IN            | SE, TO, GH        |
| 10. CS 54                  | Cameroon          | SE, TO            | 10. ICSV 1063 BF          | CI, MA, TO        |
| 11. Nagawhite <sup>2</sup> | Ghana             | MU                | 11. ICSV 401 IN           | MA                |
| 12. S 34                   | Cameroon          | TO                | 12. ICSV 1079 BF          | MA, TO            |
| 13. S 35                   | Cameroon          | TO                | 13. ICSV 1078 BF          | MA, TO            |
| 14. CS 61                  | Cameroon          | TO                | 14. ICSV 1002 BF          | MA, TO            |
| 15. CS 95                  | Cameroon          | TO                | 15. E 35-1                | TO                |
| 16. CE 315-14-1-1          | Senegal           | SE                | 16. ICSV 1049 BF          | TO                |
| 17. S 219                  | Côte d'Ivoire     | GH                | 17. ICSV 1007 BF          | TO                |
|                            |                   |                   | 18. ICSV 1083 BF          | TO                |

1. GC = Guinea (Conakry). GH = Ghana. CI = Côte d'Ivoire. TO = Togo. SE = Senegal. MA = Mali. MU = Mauritania.

2. Released in Ghana in 1971 before WECASORN's regional trials started.

Table 42. Utilization by NARS of germplasm tested in regional trials and nurseries of WECASORN between 1986 and 1992<sup>1</sup>

| <u>Country/variety</u>     | <u>Level of use</u> | <u>Year</u> | <u>Total ha</u> | <u>Country/variety</u>  | <u>Level of use</u> | <u>Year</u> | <u>Total ha</u> |
|----------------------------|---------------------|-------------|-----------------|-------------------------|---------------------|-------------|-----------------|
| <b>1. Guinea (Conakry)</b> |                     |             |                 | <b>3. Côte d'Ivoire</b> |                     |             |                 |
| ICSV 16-5 BF               | FF                  | 91-92       | 0.7             | Framida                 | DM                  | 88          | 0.25            |
| 84 W 848                   | FF                  | 91-92       | 0.7             | Malisor 84-1            | PR                  | 91          | 0.5             |
| IS 3443                    | FF                  | 91-92       | 0.7             | ICSV 1063 BF            | PR                  | 91          | 0.5             |
| CSM 388                    | PR                  | 92          | 55              | ICSH 507                | ST                  | 90          | 0.25            |
| Malisor 84-1               | ST                  | 90-92       | 0.2             |                         |                     |             |                 |
| Malisor 84-5               | ST                  | 90-92       | 0.2             |                         |                     |             |                 |
| Framida                    | ML                  | 90-92       | 1.5             |                         |                     |             |                 |
| BF 83/48-2-1               | FF                  | 92          | 0.7             |                         |                     |             |                 |
| 90 W 190                   | FF                  | 92          | 0.7             |                         |                     |             |                 |
| <b>2. Senegal</b>          |                     |             |                 | <b>4. Mali</b>          |                     |             |                 |
| F2-20                      | R                   | 89          | -               | ICSV 401 IN             | PR                  |             | -               |
| CE 180-33                  | PR                  | 92          | 5               | ICSV 1063 BF            | PR                  | -           | -               |
| CE 196-7-2-1               | FF                  | 90          | -               | ICSV 1079 BF            | CR                  | -           | -               |
| ICSV 1171 BF               | FF                  | 91          | -               | ICSV 1089 BF            | CR                  | -           | -               |
| CE 315-14-1-1              | FF                  | 92          | -               | ICSV 1078 BF            | CR                  | -           | -               |
|                            |                     |             |                 | ICSV 1002 BF            | CR                  | -           | -               |
|                            |                     |             |                 |                         |                     |             |                 |
|                            |                     |             |                 | <b>5. Mauritanie</b>    |                     |             |                 |
| ICSV 1089                  | FF                  | 91          | -               | Nagawhite               | CR                  | 90          | -               |
| CS 95                      | FF                  | 92          | -               |                         |                     |             |                 |
| Sepon 82                   | CR                  | 91          | -               |                         |                     |             |                 |
| ICSV 1163 BF               | CR                  | 90          | -               |                         |                     |             |                 |
| ICSV 111 IN                | CR                  | 91          | -               |                         |                     |             |                 |
| CS 54                      | CR                  | 92          | -               |                         |                     |             |                 |



Table 42. Continued

| <u>Country/variety</u> | <u>Level of use</u> | <u>Year</u> | <u>Total ha</u> | <u>Country/variety</u> | <u>Level of use</u> | <u>Year</u> | <u>Total ha</u> |
|------------------------|---------------------|-------------|-----------------|------------------------|---------------------|-------------|-----------------|
| <b>6. Togo - 1</b>     |                     |             |                 | <b>8. Ghana</b>        |                     |             |                 |
| ICSV 1079 BF           | CR                  | 89          | -               | ICSV 111 IN            | PR                  | 90          | 60              |
| ICSV 1078 BF           | CR                  | 89          | -               | ICSV 16-5 BF           | PR                  | 90          | -               |
| Sepon 82               | CR                  | 89          | -               | S 219                  | ST                  | 91          | -               |
| S-34                   | CR                  | 90          | -               |                        |                     |             |                 |
| S-35                   | CR                  | 90          | -               |                        |                     |             |                 |
| Framida                | CR                  | 90          | -               |                        |                     |             |                 |
| E 35-1                 | CR                  | 90          | -               |                        |                     |             |                 |
| CS 54                  | CR                  | 90          | -               |                        |                     |             |                 |
| CS 61                  | CR                  | 90          | -               |                        |                     |             |                 |
| CS 95                  | CR                  | 90          | -               |                        |                     |             |                 |
| Malisor 84-1           | CR                  | 92          | -               |                        |                     |             |                 |
| ICSV 1049 BF           | CR                  | 91          | -               |                        |                     |             |                 |
| ICSV 1063 BF           | CR                  | 91          | -               |                        |                     |             |                 |
| ICSV 1007 BF           | CR                  | 91          | -               |                        |                     |             |                 |
| ICSV 1002 BF           | CR                  | 91          | -               |                        |                     |             |                 |
| <b>7. Togo - 2</b>     |                     |             |                 |                        |                     |             |                 |
| ICSV 1089 BF           | ST                  | 91-92       | -               |                        |                     |             |                 |
| CE 180-33              | ST                  | 91-92       | -               |                        |                     |             |                 |
| ICSV 1063 BF           | ST                  | 91-92       | -               |                        |                     |             |                 |
| ICSV 1083 BF           | FF                  | 91-92       | -               |                        |                     |             |                 |
| ICSV 111 BF            | ST                  | 91-92       | -               |                        |                     |             |                 |
| Malisor 84-1           | FF                  | 91-92       | -               |                        |                     |             |                 |
| Framida                | FF                  | 87          | -               |                        |                     |             |                 |

1. Based on responses from a questionnaire. FF = Farmer's fields; PR = Pre-release; ST = On-Station; ML = Multilocation; R = Released; CR = in crosses; DM = Demonstration; ICRISAT varieties with prefixes ICSV, 84 or 90. E 35-1, Framida, IS 3443 contributed by ICRISAT. All others from NARS.

Table 43. Sorghum genotypes resistant to grain molds after two years of screening with sprinkler irrigation, Farako-Bâ, Burkina Faso, rainy season 1988 and Cinzana, Mali, rainy season 1989.

| Genotype <sup>1</sup>                       | Grain color <sup>2</sup> | TGMR <sup>3</sup> |               |
|---|--------------------------|-------------------|---------------|
|   |                          | 1988              | 1989          |
|   |                          | Mean 10 plants    | Mean 5 plants |
| ICSV 1001 BF (C)<br>(Framida)               | R                        | 2.0               | 2.0           |
| IS 14375 (G)                                | R                        | 2.0               | 2.0           |
| B 58714                                     | W/R                      | 2.0               | 2.0           |
| IS 14384 (G/B)                              | R                        | 2.0               | 2.0           |
| Kadaga (G)                                  | W/R                      | 2.0               | 2.0           |
| NSV-1 (G)                                   | W/R                      | 2.0               | 2.0           |
| CSM 388 (G)                                 | W/R                      | 2.0               | 2.0           |
| S-9 (G)                                     | R                        | 2.7               | 2.0           |
| IS 25105 (C/K)                              | R                        | 2.8               | 2.0           |
| IS 1388 (K)                                 | R                        | 3.0               | 2.0           |
| ICSV 16-5 BF (C)                            | W                        | 3.6               | 2.7           |
| Susceptible controls                        |                          |                   |               |
| SPV 386 (C)                                 | W                        | 5.0               | -             |
| Malisor 84-1 (G)                            | W                        | -                 | 4.5           |
| SE  |                          | ±0.3              | ±0.7          |
| Trial mean<br>(37 entries, 46 entries 1989) |                          | 3.7               | 3.2           |
| CV (%)                                      |                          | 8                 | 24            |

1. B = Bicolor, C = Caudatum, G = Guineense, K = Kafir

2. R = Red, W/R = white with red blotches, W = white

3. TGMR = Threshed grain mold rating, 1-5 scale, means of two replications; 4m rows, randomized block design. Three-row plots (1988), 2-row plots (1989)

Table 44. Sorghum genotypes resistant to grain molds after two years of screening with sprinkler irrigation, Cinzana, Mali, rainy season 1990.

| Genotype <sup>1</sup>                       | Grain color <sup>2</sup> | TGMR <sup>3</sup> |               |
|---|--------------------------|-------------------|---------------|
|   |                          | 1988              | 1989          |
|   |                          | Mean 10 plants    | Mean 5 plants |
| ICSV 1001 BF (C)<br>(Framida)               | R                        | 2.0               | 2.0           |
| CSM 388 (G)                                 | W/R                      | 2.0               | 2.0           |
| IS 8763 (C)                                 | R                        | 2.0               | 2.0           |
| IS 2867 (C)                                 | R                        | 2.0               | 2.0           |
| IS 3413 (C)                                 | R                        | 2.0               | 2.0           |
| IS 8219 (C)                                 | R                        | 2.0               | 2.0           |
| IS 2263 (C)                                 | W/GL                     | 2.1               | 2.6           |
| IS 3547 (C)                                 | B                        | 2.0               | 2.0           |
| IS 9225 (G)                                 | W/R                      | 2.0               | 2.0           |
| 89 W 838 (C)                                | W/R                      | 2.0               | 2.8           |
| Susceptible controls                        |                          |                   |               |
| IS 3661 (C)                                 | W                        |                   |               |
| CE 151 (C)                                  | W                        | 5.0               | 5.0           |
| SE (1990)                                   |                          | 4.7               | 5.0           |
| LDS ( $\leq 0.01$ ) (1991)                  |                          | $\pm 0.47$        | -             |
| Trial mean<br>(37 entries, 46 entries 1989) |                          | 2.9               | 1.2           |
| CV (%)                                      |                          | 16                | 12            |
| Efficiency (%) (1991)                       |                          | -                 | 102           |

1. C = Caudatum, G = Guineense

2. R = Red, W/R = white with red blotches, W = white, W/GL = White with glumes covering more than 50% of grain.

3. TGMR = Threshed grain mold rating, 1-5 scale, means of 5 plants, 2 replications; 4m, single row plots, randomized block (1990), simple lattice (1991).

Table 45. Resistant and moderately resistant sorghum genotypes to leaf anthracnose screened at Longorola and Samanko using the composite spreader row technique, Mali, rainy season 1990 and 1991.

| Genotype <sup>1</sup>                             | Disease severity<br>(1-6 scale) <sup>1</sup> |           |           |
|---|--|-----------|-----------|
|   | Samanko                                      | 1990      | 1991      |
|   |  | Longorola | Longorola |
| CSM 388   | 2.5  | 1.0       | 3.0       |
| IS 8283   | 2.5  | 2.5       | 2.5       |
| ICSB 38   | 2.0  | 2.5       | 3.0       |
| ICSB 39   | 2.0  | 2.0       | 3.0       |
| 84 S 82   | 2.0  | 2.5       | 3.0       |
| Susceptible                                       |  |           |           |
| MR 856  | 6.0  | 5.5       | 6.0       |
| SE (1990)   | ±0.70  | ±0.67     |           |
| LDS ( $P \leq 0.01$ ) (1991)                      | -  | -         | 1.38      |
| Trial mean<br>(98 entries 1990, 100 entries 1991) | 4.6  | 3.8       | 3.9       |
| CV (%)  | 15   | 17        | 13        |
| Efficiency (%) (1991)                             |  |           | 105       |

1. Disease severities are means of two replications from plot scores; single 4m row plots, randomized block (1990), simple lattice (1991).

Table 46. Disease severity of leaf anthracnose (*Colletotrichum graminicola*) on 11 local sorghum genotypes with rate reducing-like resistance, at Samanko and Longorola in Mali, rainy season 1989, 1990 and 1991<sup>1</sup>

| Genotype                        | 1989    |           | 1990    |           | 1991 <sup>2</sup> |           | Origin/<br>Program |
|---------------------------------|---------|-----------|---------|-----------|-------------------|-----------|--------------------|
|                                 | Samanko | Longorola | Samanko | Longorola | Samanko           | Longorola |                    |
| Boper R3                        | 1.5     | 1.0       | 1.5     | 1.0       | 2.2               | 1.1       | Burkina Faso       |
| Boper R4                        | 1.0     | 1.0       | 2.0     | 1.0       | 2.4               | 1.4       | Burkina Faso       |
| Boper R5                        | 2.0     | 1.0       | 2.0     | 2.0       | 2.1               | 1.2       | Burkina Faso       |
| Kampti GLM                      | 1.5     | 1.0       | 2.0     | 1.0       | 2.1               | 1.5       | Burkina Faso       |
| Blanc-Karimana                  | 2.5     | 1.0       | 3.0     | 1.0       | 2.0               | 1.2       | Benin              |
| NSV-1                           | 2.0     | 1.0       | 3.5     | 1.0       | 2.1               | 1.0       | Ghana              |
| Mankangara                      | 1.0     | 1.0       | 1.5     | 1.0       | 2.0               | 1.3       | Ghana              |
| Local 29                        | 1.0     | 1.0       | 2.5     | 1.0       | 2.4               | 1.3       | Ghana              |
| NSV 68                          | 2.0     | 1.0       | 1.5     | 1.5       | 2.2               | 1.1       | Togo               |
| NSV 74-1                        | 1.0     | 1.0       | 1.5     | 1.0       | 2.2               | 1.2       | Togo               |
| NSV 83                          | 2.5     | 1.0       | 2.0     | 1.0       | 2.0               | 1.2       | Togo               |
| Susceptible control<br>IS 18696 | 6.0     | 5.0       | 6.0     | 6.0       | 3.3               | 5.0       |                    |
| SE                              | ±0.52   | ±0.33     | ±0.55   | ±0.66     | ±0.15             | ±0.15     |                    |
| Trial mean <sup>3</sup>         | 1.7     | 1.5       | 2.2     | 1.6       | 1.2               | 1.2       |                    |
| CV (%)                          | 44      | 20        | 25      | 42        | 10                | 10        |                    |

1. Disease severities are plot scores (1989, 1990) and mean of 10 plants (1989) at 30 days after 50% flowering based on a 1-6 scale where 1= no symptoms and 6= more than 75% leaf area infected. Means of two replications.
2. Grown with composite spreader row (a mixture of susceptible varieties) after every test entry.
3. Number of entries: 41 Samanko; 39 Longorola (1989); 42 and 11 both locations (1990 and 1991, respectively).

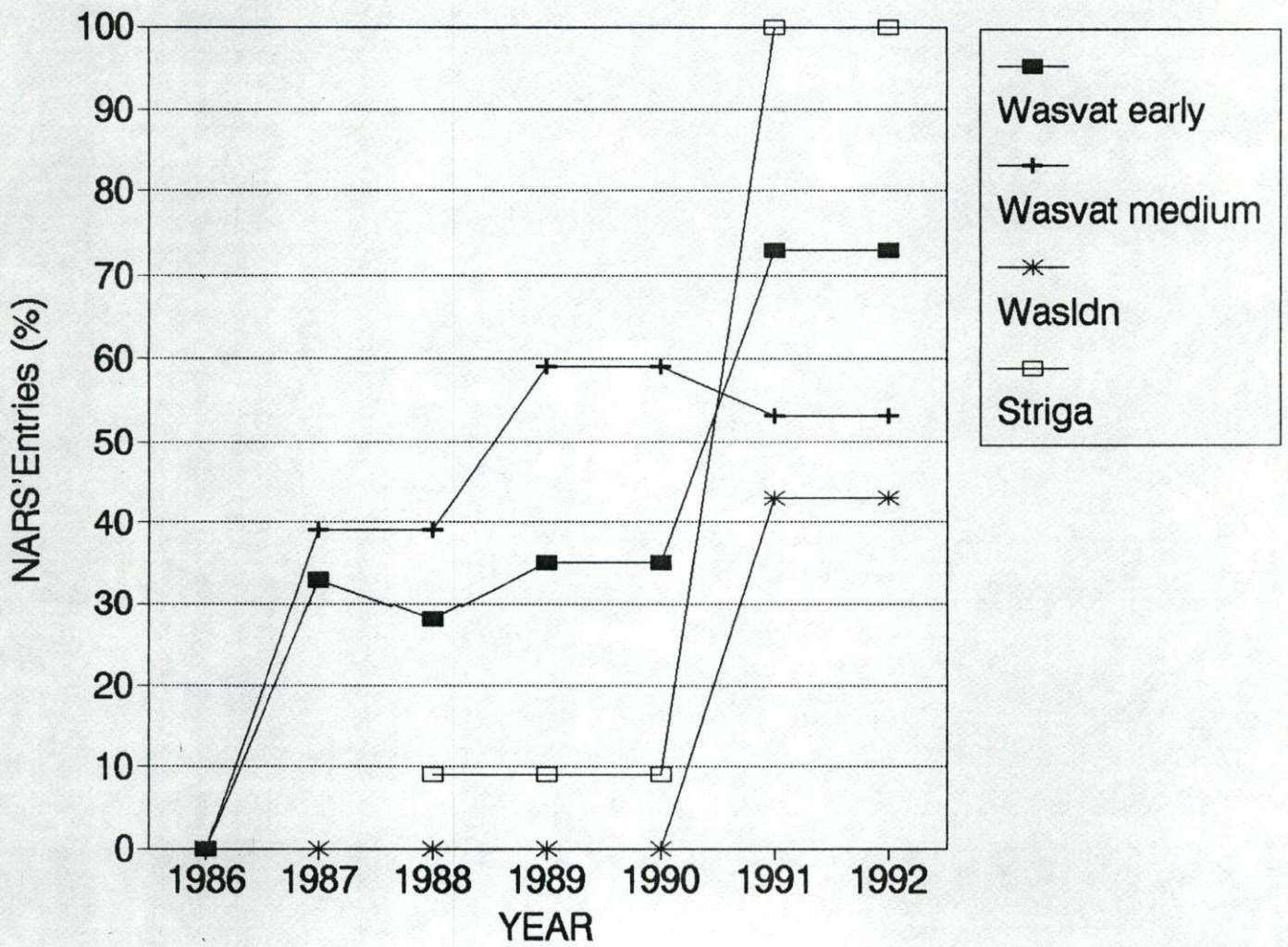
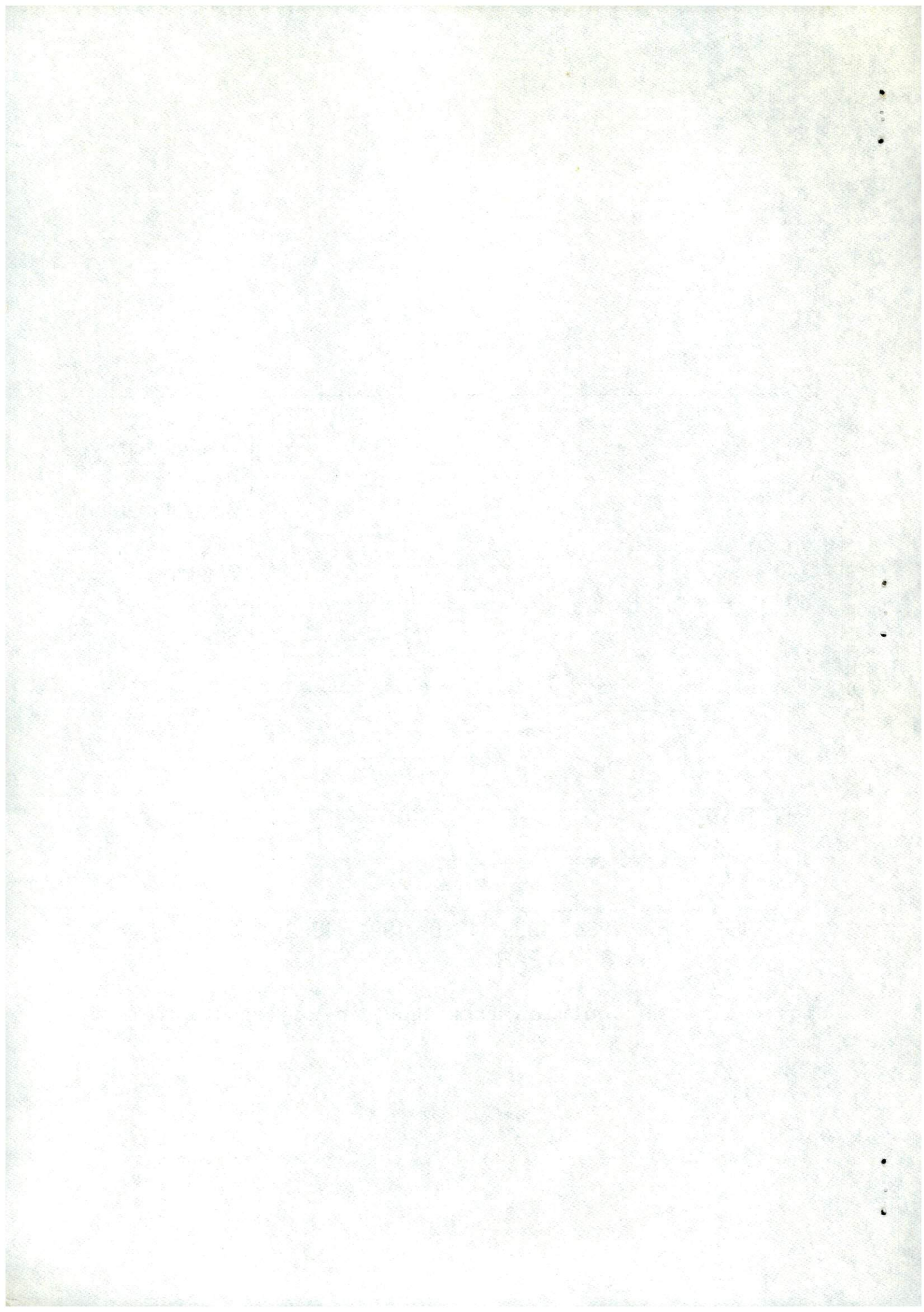


Figure 1 : Test entries from NARS in regional trials .



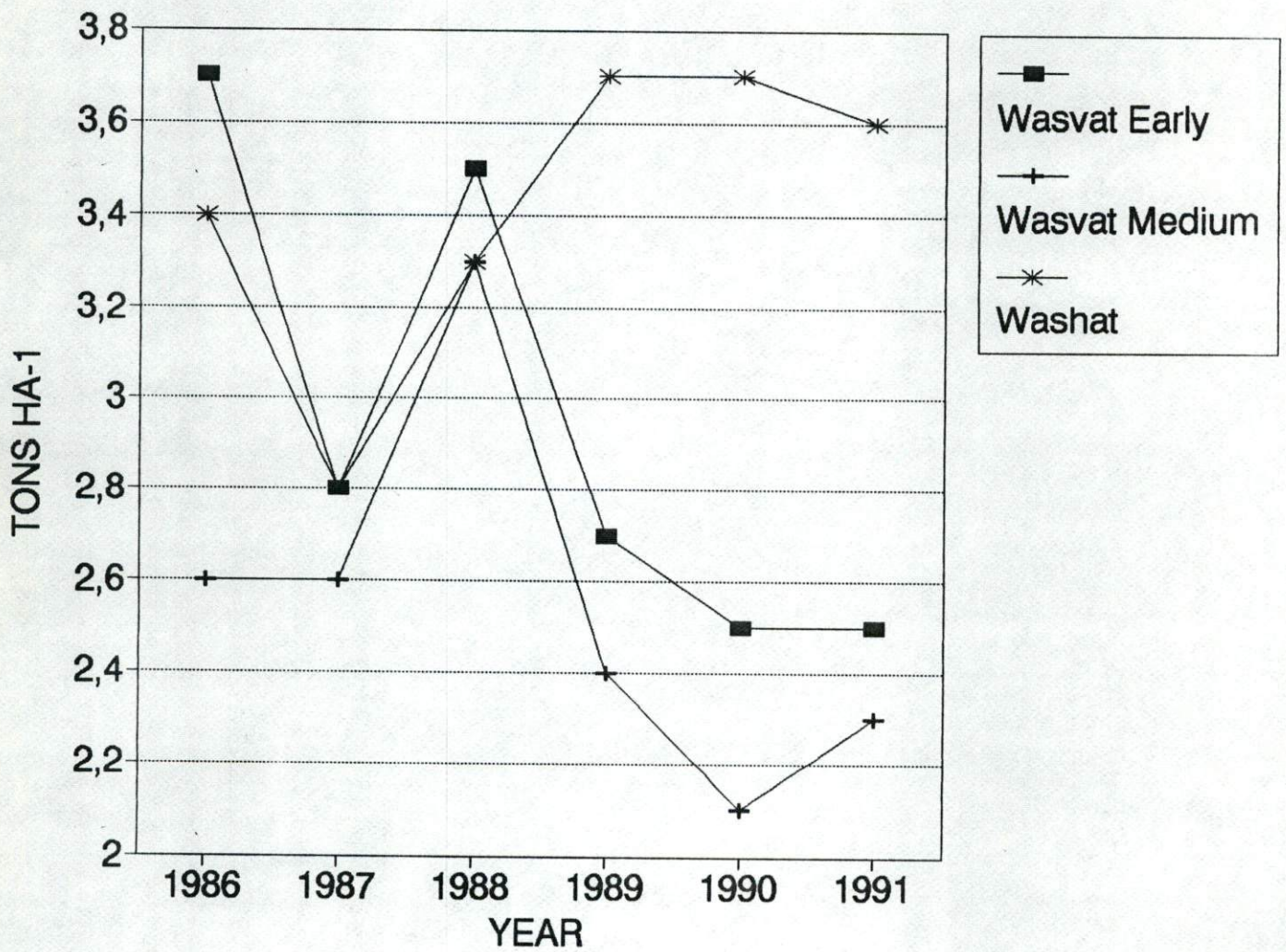
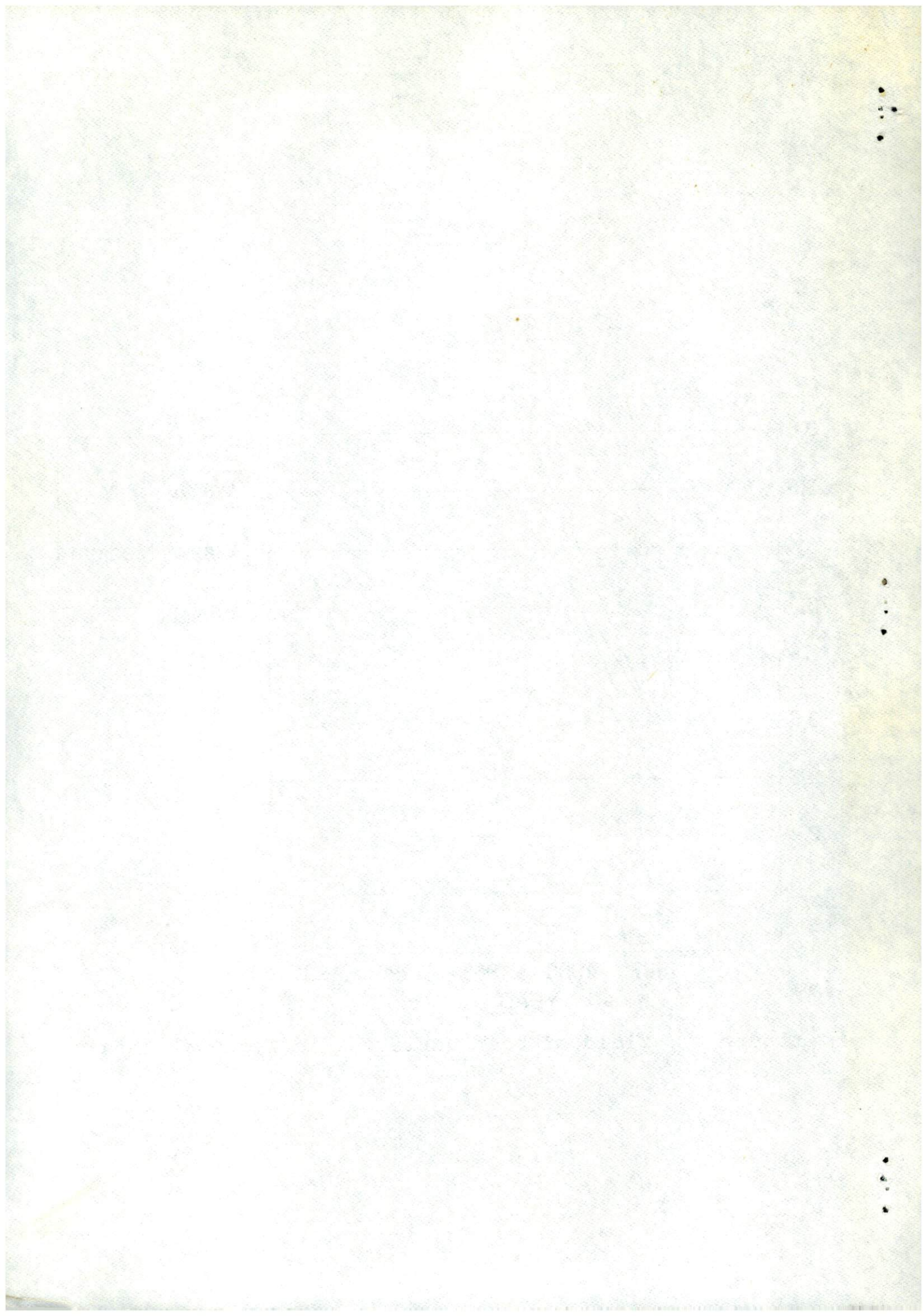


Figure 2 : Yield of best varieties in regional trials.





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