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ANNUAL

RESEARCH REPORT

Number 2

1977

Contract No.

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By:

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In support of:

National Sorghum and Millet Crop Improvement
Project No: 279-11-110-030

This project initiated its activities in the Yemen Arab Republic in March 1977. The project had to build on and go forward with what was available from 1976 regarding local trained personnel, facilities, equipment and supplies, research materials and results of past efforts.

Reports covering detailed information on project agricultural research oriented activities not previously reported elsewhere are being submitted by individual crop (calendar) years. To date these reports are as follows:

Annual Research Report Number 1 -- a brief report on information and results from the 1976 calendar year which was prior to this contract.

Annual Research Report Number 2 -- a detailed report on agricultural research oriented activities carried out in 1977.

Annual Research Report Number 3 -- detailed report on agricultural research oriented activities carried out in 1978 and their relationships to 1977.

Future annual research reports will be issued on a regular crop (calendar) year basis covering that year and any relationships to past results or future plans.

ANNUAL RESEARCH REPORT

Number 2

1977

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- Section 1 -

Introduction to the 1977 Season

The 1977 cropping season represents the first full year of project development under this contract. Report Number 1 (1976) gve a brief description of the activities of the 1976 year and field research season upon which the 1977 project activities had to be built. The first project professional personnel to arrive in-country was the Chief-of-Party and Plant Breeder, Dr. R. L. Voigt, on March 16, 1977. The project agronomist, Dr. D. M. Stewart arrived in-country on May 31, 1977.

Yemenii project personnel informed Voigt that planting of sorghum research plots at Sana'a should be done from April 15 through about the first week in May. Delay beyond the first week of May generally resulted in lower yields the later the planting date.

There was little time to fully and properly design, prepare and implement a complete research program in a completely new environment. Agronomic research plans and field tests had to be developed, the seed put up and the research fields prepared for planting in a little over three weeks. The author would like to comment at this point that the plant breeder and his family were also trying to move in and make livable an unfinished native house in a foreign country during these first few weeks. There was little time to spare.

The 1976 plot data were still in the field books in raw data form. These plot data were completely untabulated. The germplasm in the tests was unfamiliar to the plant breeder. There was no professional agriculturalist with the project or at USAID to brief the new plant breeder on the nature or state of the project research.

The 1976 field books were visually inspected and plans made to run simple averages of all replicated yield data. A visual inspection and comparison of replicated yields of individual genotypes within tests many times showed a

range of yields among replications of a genotype almost as great as the total range of plot data among all entries in the test. This indicated a great amount of variability within plots. There were quite a few missing plots. The local project technicians indicated there had been some bird damage to some plots which had not been estimated and adjusted. There also had been some plots with gaps or less than a full population of plants which also had not been estimated and adjusted. It was not possible to make these adjustments after the harvest as the data on the damage had to be collected before harvest.

Considering all of the apparent strengths and weaknesses of the 1976 research data it seemed advisable to retest in 1977 most of the genotypes evaluated in 1976. An effort was made to eliminate and not retest germplasm which appeared to be definitely inferior or unadapted for one or more reasons.

Three considerations were met by retesting many of the 1976 genotypes. First, in 1976 there had been many small tests with only a few entries each which were of a similar level of advancement in the research program. By putting all of these similar level entries into one larger test, all could be compared with one another which could not be done when they were in several separate tests. Second, the new professional plant breeder could become familiar with the germplasm in the program. Third, there was no readily available new germplasm with definite potential for development for Yemen to put into new tests.

The newly arrived plant breeder spent many long days reviewing past files of the project, mission files related to the project and the project research data books to become familiar with the past and current status of the project materials. Much of this was necessary to initiate the 1977 project activities. The project agronomist, Dr. D. M. Stewart, arrived in-country on May 31, 1977 just after planting of the field plots was completed so he was unable to

participate in the planning and decision process for the 1977 season.

A number of research field tests were designed but there was inadequate land area available to conduct these tests. Research on defoliation, plant and row spacing, dates of harvesting and other more agronomic types of tests were put aside and delayed indefinitely while emphasis was put on the selection and development of new and improved sorghum germplasm.

An effort was made to cooperate with other international and in-country donor agencies by conducting tests for them or evaluating some of their materials. Tests 77079, 77087, 77089, 77090, 77094, and 77095 were of this nature. Many tests from outside sources were not planted. A greater effort was made to cooperate with other in-country donor agencies.

The objectives of this project are to improve both sorghum and millet in Yemen. Sorghum is the main crop at the higher elevations in Yemen whereas millet is grown more at the mid and low elevations. The Sana'a Experiment Farm is at high elevation (about 7600 feet) so most of the useful research work at this elevation is on sorghum. A minimum of work on millet was initiated at Sana'a in 1977. Eventually there would be other research stations at low and mid-elevations in Yemen for research in different environments. Millet would become the subject of more intensive research at the mid and low elevations.

The USAID Mission had many meetings over several months with the Yemen Ministry of Agriculture in 1977 deciding on the location of a second Agricultural Experiment Station. The location of Al Jarubah was decided upon some time near the end of 1977. The USAID Mission began plans and some preparatory work to develop Al Jarubah in early 1978. The University of Arizona, through this project, had no authority to do anything on selection of the site or its development during 1977. The advice of the project team regarding the suitability of the selection was never solicited.

A highlight of the season was an official visit to the research plots by President Al Hamdi on October 11, 1977. The U.S. Ambassador to Yemen, USAID officials and many others accompanied the President on his tour.

This first year proved to be primarily a period of defining the problems of carrying out the project activities to meet the objectives. Actual work and progress on the project objectives proved to be limited in some areas by a number of problems. The solutions to these problems to lay more solid working foundations for future work and progress were the greatest accomplishments of this first year.

- Section 2 -

Field Procedures for Preparation, Planting and Care of the Research Plots

1. Field Preparation of the Research Plots Preparatory to Planting:

The procedures used in the preparation of the field plots were the same as had been used in 1976 and previously. The local project personnel were familiar with how it had been done previously. The University of Arizona project personnel had no way of making any changes in procedures in the first 2 or 3 weeks in country as they had no idea of the adequacy, success or failure of the previous procedures nor of the actual field conditions that would be encountered.

Tractor drawn cultivator shovels were used to make very shallow furrows or marks about 5 cm deep across the field at .7m intervals in an east and west direction. Farm laborers then formed somewhat deeper furrows at right angles to the shallow plot furrows (north and south) every 7m to give 6m long plot rows. The deeper furrows spaced every 7m were to carry irrigation water to each plot row running off each side. These deeper irrigation furrows actually composed what most US agronomic research people would call an alley. Such an irrigation arrangement prevented any further travel of mechanized equipment through the field. Everything would have to be done by hand. A larger or main irrigation ditch circled the fields and fed water into the small irrigation ditches spaced every 7m.

2. Putting up Seed in Preparation for Planting and planting:

An extremely large amount of seed was put into the seed envelopes for field planting -- between 10 and 20 times the amount needed if each seed were to produce a plant about every 10 cm. These seed were dribbled into the dry shallow seed furrow by hand in a continuous flow of seed. Another

farm laborer followed with a small "hand pick" stirring the seed and dry soil in the bottom of the seed furrow. The seed would be buried from about 2 to 6 cm with some seed left near or on the surface. There was a rather variable seeding depth for the seed.

3. Irrigation of the Newly Planted Plots and Seedling Emergence:

Immediately after planting the irrigation water was started. The output of one pump was only a couple of liters per second. Another newer well some distance away had a higher output of 5 or 6 liters per second but could not always be used efficiently due to distance and pipe problems.

It was difficult to get the irrigation water to flow through the "alley" irrigation ditches let alone down the shallow furrows because of the unleveleness of the fields. Water was relatively deep in some areas and very shallow in others. In fact a few areas could barely be watered at all. The water was run in the shallow seeded furrows right on top of the planted seed. Not much water could be put on since the seeded furrows were only 3 or 4 cm deep. The infiltration rate of water into the soil was very slow. The soil was very heavy with little organic matter. Actually the top soil of surrounding fields were being made into sun dried mud bricks for building construction if no one was currently cropping the land.

The small amount of irrigation water applied soaked in a few centimeters in a couple of hours. With the continuous sun and wind the surface of the soil over the seed dried into a hard brick-like crust in about 24 hours. This necessitated reirrigation about every 72 hours or so. The average time to emergence was some 7 to 10 days. The rather cool nights probably tended to slow germination and emergence. This long time to emergence meant perhaps 2 to 4 irrigations to get the plants up. The biggest problem seemed to be the dry soil surface crust which would form and prevent seedling emergence.

Seedling emergence would be rather eratic within plots. Certain areas that were high and not much water could be applied stayed too dry and nothing emerged for distances up to a meter and then maybe in clumps. Portions of plots that were lower and received more water had areas where nearly every seed furrow would be like a narrow strip of lawn.

4. Thinning, Weed Control, Stem Borer Control and Fertilization:

The planting and irrigation to attain emergence took about 3 to 4 weeks. By the end of the planting and irrigation weeds were starting to emerge rapidly in the first planted plots. In addition the plants in these first planted plots were attaining a height of 8 to 12 cm which was suitable for thinning. There had also been stem borer damage every year during the late seedling stage.

At this point there were three operations needing to be done at once -- hand weeding, hand thinning and spraying for stem borers. There was not near enough farm labor to keep up with the weeds alone. The past procedure had been to spray for stem borers and work at the hand weeding as best they could. The chemical for control of the stem borers was purchased from the German farm whose research was on pest control. The chemicals were applied as per their instructions. Stem borer control was not completely effective and damage continued. Repeated applications were made. Also the two project owned sprayers were old, worn and very time consuming to keep in operation. The project did not yet have set up a system of making in-country purchases of any size. The German Farm had new sprayers available at about $100 each. The magnitude of the problem was not all that obvious at first.

From past experience the local project research personnel proceeded to delay thinning until the stem borer was under control and then thin out the insect damaged plants and then healthy plants as necessary to attain the desired population. This seemed to be logical except much of the thinning

ended up being done when plants were sometimes as high as one half meter which was far too late. Much damage had already been done to nearly half grown plants by over-crowding during the early half of their development cycle. Also the plants left in the plots had their roots damaged some from adjoining plants being pulled out. The extent of the damage from late thinning was probably not fully appreciated by the project personnel. However, there was little that could be done under the circumstances.

In the meantime, weeds were growing rapidly and overtaking and crowding out the sorghum. There was not enough farm labor to keep up with hand weeding yet there was the thinning and stem borer control which had to be worked at. The result was that the thinning was finally completed at too late of stage of plant growth in many plots. There could be variation in this thinning among plots within tests which contributed to variability within tests. The weeds would nearly overtake the sorghum in some plots before the weeds could be removed by hand. Variation in removing weeds from some plots within a test before other plots could be weeded resulted in variation in weed competition among plots within tests. The weeds grew back rapidly so the battle of the weeds was continuous with the weeds seeming always having the upper hand. Chemical weed control was virtually unknown in Yemen. No chemicals were available in Yemen. The one problem weed in the sorghum field was unknown in the US and no information on chemical control was available. Possible herbicides were liquid in form and could not be shipped from the U.S. by U.S. carriers due to regulations on carrying toxic or liquid substances.

During the second month at about one third growth of the plants was the time selected to apply a small amount of nitrogen fertilizer. This was worked into the plots with the hand weeding (hand cultivation) operations. About 30 kilos per hectare of available nitrogen was applied. This was not a heavy rate since we were trying to maintain limited irrigation or semi-arid conditions.

By the time the earliest maturing sorghum genotypes were starting to boot at about 3 months, the stem borer problem was under control or had passed, the thinning was being completed and the weed problem was abating since the main weed involved had essentially completed its life cycle and no new seedlings were emerging.

During bloom aroung the 4th month it became apparent that there was considerable variation in bloom date of plants within plots of known homozygous genotypes. This variability in maturity was sure to contribute considerable variation to research data from the plots. There were variable plant height differences among these plants. These anomalies seemed to start early in the growing season during the erratic emergence of the seedlings.

It seemed obvious that improved methods of land preparation, seed planting, weed control, thinning, insect control and irrigation was highly desirable in order to develop reliable research data from the plots with a minimum of variability. Action taken on these needs is covered in a later section.

- Section 3 -

Research Data Explanation and Collection Procedures

Following is a listing of various major items of data that were collected from among the research materials being tested with a description of the data and how they were collected and calculated. Other minor items of data were collected as appropriate in various situations.

1. Pedigree: This a plant breeding term generally referring to the cross or test and plot from which a single plant or genotype was selected to thereafter have its own identity. It may also be a number from a germplasm collection.

2. Source: Refers to the project test and plot from which actual seed was obtained for this particular planting, or the name of the outside source of the seed.

3. Percent stand: Refers to an estimated amount of plot row actually present expressed as a percent of the total possible.

4. Seedling vigor: Differences in emerging seedling growth rates were noted among genotypes. These differences were evaluated as 1=good, 2=average and 3=poor. It seemed desirable to compare these seedling vigor scores with future development and production of the genotypes for possible clues for early identification of superior genotypes.

5. Days to 50% bloom: When the heads had emerged from the boot and were starting to bloom the date was recorded when all heads had bloomed halfway down (half of the florets in the plot had bloomed). This simple situation usually never existed because of a range of beginning and ending of blooming among plants within the plot. An educated estimate had to be made as to when the entire plot was about halfway through blooming.

Considerable experience with sorghum is necessary to correctly determine this characteristic under many conditions.

The days to this bloom date are calculated from the date of planting in moisture or date of first irrigation if planted dry.

This characteristic of date of 50% bloom is used as a very reliable and precise measure of the maturity of the genotype involved.

6. Height: For general evaluation and comparison among genotypes of sorghum this is simply the average distance from the ground level to the top of the head of typical plants within the plot. Considerable judgment may be needed to estimate this character under conditions of considerable variation among plants within plots.

The value of this character is usually expressed in centimeters.

7. Agronomic rating of the plant and of the head: The average or typical plant in a plot was evaluated on a scale of 1 to 3 with a score of 1 being equal to "good", 2 equal to "average" and 3 being "poor". These evaluations are rather professional and experienced comparisons to the typical plant desired and needed by the Yemeni farmer. The heads on an average or typical plant in a plot was visually rated in a similar manner on a similar scale but independent of the evaluation rating given to the plant.

These evaluations by experienced personnel are necessary to initially select experimental materials with potential warranting further testing. There is no other way to initially sort out promising genotypes for further, more precise evaluation. For experienced personnel there is a high degree of correlation of these visual ratings with actual grain and forage production.

8. Lodging: Just prior to their harvest for grain all plots were evaluated for lodging. These evaluations were expressed in a percent value composed of a combination of a value for number of lodged plant combined with degree or angle of lodging. It is necessary that the person be experienced

and that the same person do all of the evaluations within a test since these estimates can differ by individuals.

9. Bird damage: Bird watch personnel during daylight hours were very successful in keeping down bird damage of the plots. Most plots had little or no bird damage. Estimating bird damage correctly takes considerable experience. At first the new or inexperienced researcher will nearly always over-estimate the grain loss. This results in plots with the greatest bird damage coming up with the highest yields. Several years experience is sometimes necessary to calibrate one's self. It is also necessary, for uniformity of data, that the same individual do all estimating, at least within tests. Plot yields were adjusted for these estimated bird damages.

10. Grain production: The grain was allowed to mature and dry down on the plant in the field plot in a normal manner. However, due to continual bird problems harvest was not delayed much beyond hard dough stage of development. There was variation in maturity among plants within most plots so some heads were high in moisture.

The harvesting of the grain heads from each plot was done by hand. Each test was harvested separately. The total elapsed time in the field taken to hand harvest the grain of <u>all</u> of the tests in 1977 was only about 3 days. The actual harvesting was spread out over a greater period of time because of differences in planting dates and general maturities among tests. By hand harvesting carefully every head was harvested. Nothing was lost whereas most mechanized harvests in the U.S. have field losses of various magnitudes. This phase of the research was actually very precise because of the hand operation.

There was no place to hang the sacks of grain heads up to finish drying. They were piled inside of rooms in the partially constructed laboratory facilities at the USAID Mission. They had to be turned and repiled every

couple of days to facilitate drying. However, field mice and rats quickly got into the piles chewing holes through the cloth sacks, eating grain and making nests of the paper tags. It was a bad situation which contributed further to the research data variability.

Threshing was done on two head threshers which were not designed or built for threshing for yield purposes. These head threshers normally throw out and lose considerable seed with each head threshed. Tape was used in an attempt to seal up places of seed loss. A special cover of the feeding chute was constructed to reduce seed loss. Special operating instructions were enforced as well as sun drying all bags of a couple of hours just prior to threshing. The system wasn't perfect but it was the best we could do. The machines tended to crack and break the large seed of the typical Yemen sorghum.

The threshed grain was weighed on a sliding balance scale (the only one available on the project) which took considerable time to slide the scale weight to a balance for each weight. Many days were spent just obtaining plot grain weights.

These plot grain yields were then adjusted for any percent bird damage followed by adjustment for percent stand less than 100%. The resulting plot grain yield then reflected the theoretical performance of a full plot undamaged by birds. These full plot yields of grain were then converted to yields per hectare.

There were numerous instances of several replications of the same entry in a test that had extreme variation among the replicated plot yields of the particular entry almost as extreme as the high and low plot yield for the whole test. These particular plots were complete plots without bird damage. They were unadjusted for short plot or bird damage. Such variability of research data indicates a very probable lack of reliability of the research data. This further illustrates the need for improvement of research resources and procedures.

- Section 4 -

Research Test Descriptions, Objectives, Composition, Procedures and Results

In Table 1 is a list of 30 tests with a summary of the number of entries, number of replications, number of plots, number of rows per plot and total number of rows. A comparison to 1976 is also given showing that in 1977 there were 2,446 genotypes tested compared to 1400 in 1976. There were a total number of plot rows of 5320 in 1977 compared to 3131 in 1976.

Figure 1 is a map showing the general configuration and size of the Agricultural Research farm at Sana'a. Field C (.67 acres) was in alfalfa in 1977 leaving about 7.79 acres in fields A, B, D and E available for research plots. The irrigation wells proved to be incapable of getting water to field E so the 3 acres there were lost after it was planted. An explanation of these losses is given with each test involved. We were able to complete research on only about 60% of the plots planted due to this problem.

Following in this section are individual reports for each test explaining its background and presenting all data available and interpretations of the results.

FIGURE 1

BERO AL GOHOUME
AGRICULTURAL
RESEARCH FARM
SANA'A, YEMEN A.R.
1977

S ⟶ N

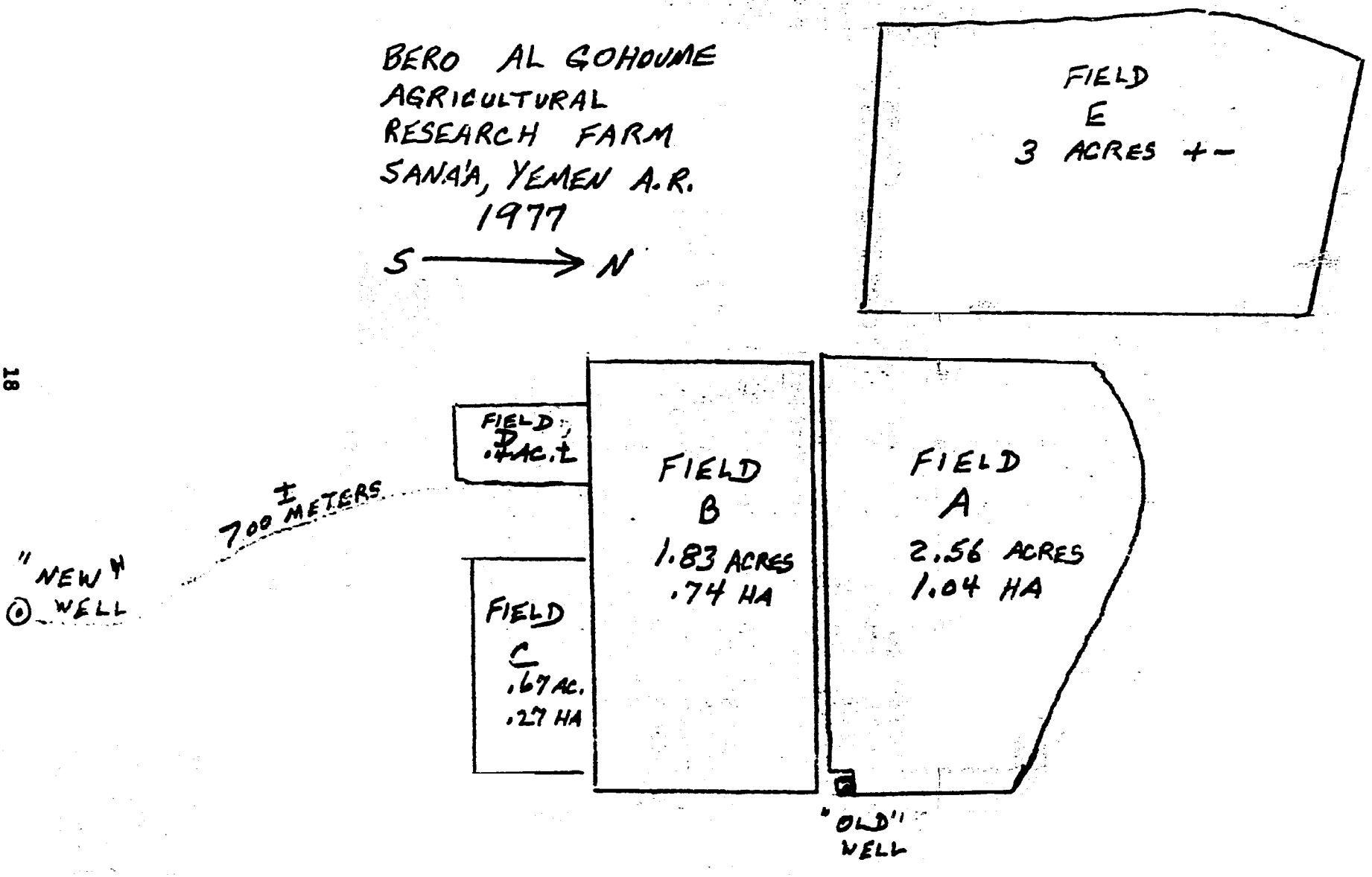

Table 1. SANA YEMEN 1977 FIELD RESEARCH EFFORTS ON SORGHUM AND MILLET

Field	1977 Test No.	Crop Type*	TEST NAME	NO. ENTRIES	NO. REPS.	NO. PLOTS	ROWS/ PLOT	NO. ROWS
B	77074	S	Early-Preliminary Yield Test	126	2	252	1	252
B	77075	S	Late-Preliminary Yield Test	113	2	226	1	226
A	77076	S	Early-Advanced Yield Test	85	4	340	1	340
A	77077	S	Late-Advanced Yield Test	90	4	360	1	360
B	77078	S	Hybrid-Adv-Gen-Yield-Depr-Test	20	4	80	2	160
B	77079	S	Pest Resistance Nursery	24	4	96	4	384
B	77080	S	Exper. Hybrid Yield Test	49	3	147	1	147
B	77081	S	Exper. Hybrid Observ. Test	82	1	82	1	82
E	77082	S	Head-to-Row-Early	345	1	345	1	345
E	77083	S	Head-to-Row-Late	342	1	342	1	342
B	77084	S	Miscellaneous Prel. Yield Test	155	2	310	1	310
A-B	77085		Demonstration	77	1	77	2 +	146
A	77086	S-M	Date-of-Planting Test	24	4	96	4	384
E	77087	M	IPMAT #2	22	3	66	1	66
A	77088	S-M	Nursery	664	1	664	1 +	664
E	77089	S	Int. Sorg. Coop. Nursery	34	3	102	1	102
E	77090	C	East African Maize Var. Trial	27	2	54	3	162
B	77091	S	Sana - Yield Test	7	4	28	1	28
E	77092	M	Millet-Yield Test	44	2	88	1	88
A	77093	S	F_3 Selections	76	1	76	1	76
E	77094	S	Sorghum Y. Test (Lhakany)	8	3	24	1	24
E	77095	M	Millet Y. Test (Lhakany)	4	3	12	1	12
E	77096	SG	Sudan Grass	28	1	28	2	56
A		M	Marana Millet Composite					45
A		S	Sorghum Composite					101
B		S	Sorghum Composite					24
D		M	Big-Headed Millet POPN.					60
D		S	Snowflake Fert. + Ster. R.M.					180
E		S	NP3R Dry Steriles (Sorg.)					85
E		M	Senegal Millet POPN.					69
1977 = 30 Tests = Totals =				2446		3895		5320
1976 = 38 Tests = " =				1400				3131

*S = Sorghum, M = Millet, SG = Sudan Grass

TEST NO. 77074

Early Maturity Preliminary Yield Test

Test Description and Purpose:

This test consisted of 122 experimental sorghum genotypes with a local check entered 4 times and replicated twice in a grain yield test. The purpose was to evaluate each experimental entry for seedling vigor, yield of grain, maturity, height, and agronomic desirability of the plant and head. These same evaluations were made of the local genotype so that a judgment could be made for keeping the superior experimental genotypes and discarding those not better than the local type.

Seed Source, Plot Size and Treatment:

One hundred twenty two experimental genotypes were entered in this test which had been selected from four 1976 tests (76013, 76015, 76016, and 76036). All of these genotypes were still in early phases of evaluation in the breeding program so they were combined into one test so that all could be compared with each other for selection of the best. These entries were supposedly all of an early maturity; however, the previous evaluation for early maturity was not always right.

The plot size was one row six meters long and .7 meter wide and replicated twice in a randomized complete block design.

The test was grown under a somewhat limited moisture (irrigation) regime in order to evaluate the entries for adaptation to droughty rain-fed growing conditions. Selected superior genotypes will be entered in an advanced yield trial in 1978.

Local varieties as appropriate checks were included as test entries as standards against which experimental entries will be selected or discarded.

Results:

The averaged data from both replications are presented in Table 2 for all characters measured. The entries are arranged in the table in the order of their grain yield. A local check variety entered four times in the test ranked 8, 20, 22, and 58 out of 126. These 4 entries of the same local check ranged in grain yield from 3067 kg/ha down to 2357. This range of 710 kg in performance of the same genotype within the test indicates something about the variability inherent in the test. The level of yield of the checks would indicate that a fair portion of the experimental entries should be discarded on the basis of grain yield.

The other characteristics of maturity, height and agronomic appearance of plant and head were also considered in retention of entries. Because of the rather low precision of testing throughout the season it is quite likely that some superior genotypes are ranked below the checks in this test.

Table 2. Grain Yield and Other Agronomic Data from Early Maturing Experimental Genotypes in a Preliminary Yield Trial (77074) at Sanaa, Yemen in 1977

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Ht. cm.	Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
1	57	76013-140	2.5	132	100	2	2	5286
2	22	76013-069	2.5	115	88	2.5	2.5	3790
3	12	76013-031	3	123	88	2.5	2	3517
4	120	76016-057	3	140	83	2.5	2	3357
5	105	76016-002	2	132	78	2	1.5	3343
6	36	76013-107	2	119	104	3	3	3243
7	126	76016-066	2.5	134	92	3	2.5	3081
8	15	Local	1	123	114	2.5	3	3067
9	69	76013-167	2	134	88	2.5	2.5	3050
10	52	76013-129	3	122	76	3	2.5	3045
11	114	76016-048	2.5	123	79	3	3	3014
12	121	76016-058	3	142	60	2.5	1.5	2998
13	34	76013-103	3	126	82	3	3	2990
14	54	76013-134	2.5	124	80	3	2	2955
15	48	76013-124	3	125	78	3	2	2921

*1 Plot Size = 1 row (.7 m between rows) X 6 m long, replicated two times.

*2 Planted dry on 27 April, irrigated on 29 April, 1977.

Table 2. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Ht. cm.	Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
16	55	76013-135	2.5	124	90	3	2.5	2881
17	51	76013-128	2.5	123	88	3	3	2879
18	89	76015-019	3	140	60	3	2.5	2867
19	39	73016-113	3	126	80	3	3	2836
20	73	Local	2	122	104	3	3	2790
21	28	76013-091	2.5	136	74	3	2.5	2781
22	44	Local	1.5	131	84	3	3	2776
23	26	76013-085	2.5	130	95	2	2.5	2738
24	38	76013-112	3	128	82	3	2.5	2731
25	33	76013-102	3	130	85	3	3	2724
26	85	76013-203	2.5	128	78	2.5	2.5	2657
27	111	76016-039	2.5	121	64	2.5	2	2652
28	84	76013-201	2.5	132	83	3	3	2648
29	92	76015-026	2.5	127	85	3	2.5	2633
30	10	76013-028	1.5	124	74	3	1	2610
31	58	76013-141	3	124	82	3	2.5	2605
32	99	76015-081	3	132	78	2	2	2595
33	109	76016-037	3	136	76	2.5	2	2583
34	70	76013-173	3	130	78	2.5	2	2564
35	21	76013-067	3	132	88	3	2	2555

Table 2. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Ht. cm.	Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
36	27	76013-090	3	134	62	3	1.5	2552
37	96	76015-038	2	132	104	2.5	2	2545
38	115	76016-049	3	138	76	2.5	2	2543
39	46	76013-121	2.5	134	68	3	2	2531
40	19	76013-053	3	136	101	3	2.5	2521
41	64	76013-156	2.5	123	78	3	2.5	2498
42	7	76013-018	2.5	135	78	2.5	2	2490
43	78	76013-184	3	132	89	3	2.5	2486
44	122	76016-059	3	142	78	2.5	2	2481
45	2	76013-007	2.5	128	75	3	2	2476
46	81	76013-194	2.5	129	100	3	2.5	2476
47	113	76016-045	3	138	86	3	2.5	2457
48	63	76013-154	2.5	128	66	3	3	2452
49	29	76013-092	3	132	70	3	2.5	2450
50	67	76013-164	3	136	99	2.5	2	2443
51	25	76013-084	2.5	131	60	3	2	2438
52	112	76016-042	3	137	82	2	2	2424
53	49	76013-125	3	139	88	2	1.5	2400
54	32	76013-100	3	132	85	3	3	2386
55	95	76015-035	3	132	57	3	1.5	2386

Table 2. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Ht. cm.	Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
56	13	76013-032	2.5	128	82	2.5	2	2381
57	43	76013-119	3	130	78	3	2.5	2376
58	102	Local	1.5	129	80	3	3	2357
59	107	76016-008	3	142	71	2.5	1.5	2352
60	110	76016-038	2.5	130	60	3	1.5	2331
61	6	76013-016	3	121	98	2	2.5	2314
62	5	76013-014	2	132	100	2.5	2.5	2290
63	80	76013-191	3	136	82	3	3	2290
64	101	76015-089	3	132	64	3	3	2250
65	108	76016-012	3	138	55	3	2.5	2248
66	83	76013-199	3	137	74	3	2	2240
67	75	76013-179	2.5	132	75	3	3	2233
68	16	76013-047	2.5	129	82	3	2.5	2224
69	76	76013-180	3	135	84	3	2.5	2205
70	8	76013-020	2.5	142	64	3	2	2176
71	93	76015-030	3	130	74	3	2	2176
72	104	76015-100	3	144	80	2.5	2	2140
73	41	76013-115	3	135	65	3	3	2131
74	72	76013-177	2.5	128	68	3	3	2131
75	68	76013-165	3	133	96	3	2.5	2119

Table 2. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Ht. cm.	Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
76	66	76013-163	3	137	68	3	2	2062
77	61	76013-149	2.5	137	58	3	2	2057
78	4	76013-012	2.5	138	55	3	1	2048
79	91	76015-023	3	146	78	2	2	2045
80	60	76013-147	2.5	122	83	3	2	2029
81	90	76015-020	2.5	142	77	2.5	2	2014
82	18	76013-049	3	128	72	3	3	2010
83	24	76013-078	3	131	88	2.5	2.5	2010
84	118	76016-053	3	126	60	3	3	1993
85	97	76015-060	3	141	72	3	2	1967
86	35	76013-105	3	128	85	3	3	1952
87	116	76016-051	3	128	65	3	3	1943
88	11	76013-029	3	122	84	3	2	1924
89	17	76013-048	2.5	122	60	2.5	3	1919
90	3	76013-011	3	134	74	3	2.5	1914
91	23	76013-070	2	130	95	2	2.5	1904
92	74	76013-178	3	130	68	3	3	1904
93	94	76015-032	3	136	40	3	3	1904
94	59	76013-142	3	128	60	3	3	1886
95	40	76013-114	2.5	134	78	3	2.5	1881

Table 2. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Ht. cm.	Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
96	62	76013-151	3	134	62	3	2	1860
97	65	76013-161	2.5	133	79	3	2.5	1857
98	55	76013-138	3	126	79	3	3	1838
99	45	76013-120	3	133	65	3	3	1819
100	86	76013-204	3	137	76	3	3	1819
101	123	76016-061	2.5	133	65	3	2.5	1786
102	30	76013-097	3	136	72	3	2.5	1767
103	47	76013-123	3	127	64	3	3	1767
104	37	76013-108	2.5	127	50	3	2.5	1726
105	100	76015-083	3	136	48	3	3	1719
106	117	76016-052	2.5	128	70	3	3	1679
107	71	76013-175	3	138	80	3	3	1674
108	1	76036-042	3	146	77	2.5	1	1650
109	124	76016-064	3	134	94	2.5	2	1610
110	88	76015-006	2	137	42	3	2	1600
111	14	76013-034	3	132	78	3	2.5	1543
112	98	76015-072	2.5	138	88	3	2.5	1540
113	105	76016-003	3	150	52	3	1.5	1517
114	39	76013-185	3	134	47	3	2.5	1510
115	20	76013-055	3	128	43	3	3	1429

Table 2. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Ht. cm.	Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
116	31	76013-099	2.5	138	69	3	2.5	1417
117	42	76013-116	3	138	94	2	2	1376
118	82	76013-198	3	132	85	3	2.5	1369
119	50	76013-126	3	132	75	2.5	2	1357
120	53	76013-130	3	126	58	3	2	1348
121	119	76016-055	3	152	68	3	2	1274
122	87	76015-004	3	138	62	3	3	1136
123	77	76013-182	3	154	72	2.5	2	945
124	103	76015-092	3	146	40	3	2	919
125	125	76016-065	2	154	100	2	2.5	871
126	9	76013-027	3	155	88	3	3	557

TEST NO. 77075

Late Maturity Preliminary Yield Test

Test Description and Purpose:

This test contained 109 experimental sorghum genotypes with a local check entered 4 times and all replicated twice in a grain yield test. The purpose was to evaluate each experimental entry for seedling vigor, yield of grain, maturity, height, and agronomic desirability of the plant and head. These same evaluations were made of the local check genotype so that a judgment could be made for keeping the superior experimental genotypes and discarding those not better than the local type.

Seed Source, Plot Size and Treatment:

The 109 experimental genotypes in this test came from six 1976 tests (76013, 76015, 76016, 76025, 76036, and 76041). All of these genotypes were still in early phases of evaluation in the breeding program so they were combined into one test so that all could be compared with each other for selection of the best. These entries had been evaluated as late maturity in the 1976 tests as compared to the early maturities entered in 77074; however, these previous evaluations were not entirely precise.

The plot size was one row six meters long and .7 meters wide and replicated twice in a randomized complete block design.

The test was grown under a somewhat limited moisture (irrigation) regime in order to evaluate the entries for adaptation to droughty rain-fed growing conditions. Selected superior genotypes will be entered in an advanced yield trial in 1978.

Local varieties as appropriate checks were included as test entries as standards against which experimental entries were selected or discarded.

Results:

The averaged data from both replications are presented in Table 3 for all characters measured. The entries are arranged in the table in the order of decreasing magnitude of their grain yields. A local check variety entered four times in the test ranked 10, 20, 55 and 61 in the test. These 4 entries of the same local check ranged in grain yield from 3619 down to 2374 kg/ha. This range of 1245 kg in performance of the same genotype is quite large and is 75% larger than the range of these same checks in test 77074. There seems to be a large amount of variability within the test which warrants selection of experimental genotypes below the level of the checks. This would indicate that a fair portion of the experimental entries could be discarded on the basis of grain yield.

The other characters of maturity, height and agronomic appearance were also considered. The cutoff point for selection on yield was below the average for the checks because of the lack of precision of testing encountered throughout the season. It is entirely possible and very likely that some actually superior genotypes are ranked below the checks in this test.

Table . Grain Yield and Other Agronomic Data from a Preliminary Yield Test of Late Maturing Experimental Sorghum Genotypes (77075) at Sana'a, Yemen in 1977.

Table Rank No.	Entry No.	*1 Origin	*2 Seedling Vigor	*3 Days to 50% Bloom	Plant Ht. cm	*4 Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
1	111	76025-052	2	123	129	2	2	4114
2	102	76025-043	2.5	121	112	2	2	4048
3	100	76025-041	3	132	105	2	2	4024
4	92	76025-032	2	130	114	2	2	3855
5	77	76025-017	3	130	102	2.5	2.5	3848
6	50	76013-054	2	113	68	3	3	3757
7	79	76025-019	3	128	128	2	2	3755
8	21	76036-027	3	144	59	3	2	3741
9	58	76015-110	2.5	136	108	2	2	3624
10	12	Local	1.5	124	94	3	3	3619
11	24	76036-060	3	146	68	2.5	1	3610
12	86	76025-026	3	120	94	3	2.5	3550
13	10	76036-006	1.5	134	105	2	2	3541
14	53	76015-085	2.5	118	90	3	2.5	3481
15	47	76015-024	3	124	102	3	3	3471
16	94	76025-034	3	148	70	2	1.5	3367
17	1	76041-001	3	149	65	3	2.5	3269
18	113	76025-054	2	136	115	2	1.5	3229
19	63	76016-016	2	124	75	2.5	2	3191
20	72	Local	1.5	118	102	3	3	3191
21	4	76041-004	3	138	60	3	1.5	3176
22	23	76036-059	3	144	60	3	1	3176
23	93	76025-033	2.5	140	80	3	2	3164
24	57	76015-108	1.5	131	112	3	3	3152
25	18	76036-047	2.5	140	78	2.5	2	3148
26	68	76025-004	2	114	91	2	2	3129
27	59	76015-125	2.5	140	109	2	2	3079
28	90	76025-030	2.5	128	118	2	2	3069
29	55	76015-088	2.5	130	75	3	2.5	3033
30	83	76025-023	2	128	114	2.5	2.5	3033
31	19	76036-053	3	139	72	3	1.5	3024
32	87	76025-027	3	131	112	3	2.5	3007
33	99	76025-040	2.5	118	88	3	1.5	2900
34	29	76036-090	2.5	146	52	3	1	2898
35	61	76015-127	2.5	136	92	3	2.5	2895

*1 Plot Size: 1 row (.7m between rows) x 6m long, replicated two times.
*2 Seedling vigor rating scale: 1=good, 2=average, 3=poor.
*3 Planted dry on 27 April and irrigated on 28 April 1977.
*4 Agronomic rating scale of mature plants and heads: 1=good, 2=average, 3=poor

Table 3. (Continued)

Table Rank No.	Entry No.	*1 Origin	*2 Seedling Vigor	*3 Days to 50% Bloom	Plant Ht. cm	*4 Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
36	110	76025-051	3	139	114	3	3	2862
37	43	76013-187	2	128	86	3	3	2852
38	54	76015-087	2	116	91	3	3	2831
39	40	76013-166	2.5	131	74	2.5	1.5	2812
40	49	76015-053	2	126	92	3	2.5	2781
41	97	76025-038	2.5	138	112	3	2.5	2774
42	107	76025-047	3	130	94	3	2.5	2771
43	75	76025-014	2.5	144	72	3	2.5	2748
44	78	76025-018	2.5	118	111	2	2	2748
45	85	76025-025	3	136	99	2.5	2	2705
46	51	76015-061	2.5	115	88	2.5	2	2655
47	60	76015-126	2.5	119	102	2.5	2.5	2650
48	3	76041-003	3	144	50	3	2	2629
49	98	76025-039	2.5	125	112	2	1.5	2557
50	62	76016-007	3	118	62	3	2	2548
51	65	76016-056	2.5	128	78	3	2	2538
52	45	76013-195	1.5	124	108	3	2	2519
53	67	76025-003	3	144	88	2	2	2517
54	88	76025-028	2.5	134	106	2	2	2510
55	103	Local	1.5	122	100	2.5	3	2510
56	109	76025-049	2.5	134	115	2.5	2	2495
57	84	76025-024	3	137	106	3	2	2467
58	31	76036-106	2.5	155	56	3	1	2457
59	101	76025-042	2.5	126	88	3	2	2429
60	16	76036-040	3	157	59	3	2	2424
61	42	Local	1.5	132	89	3	3	2374
62	76	76025-015	3	138	68	3	2.5	2343
63	8	76036-008	2.5	147	45	3	2	2329
64	32	76036-111	2.5	160	58	3	1.5	2326
65	14	76036-035	2.5	158	85	2.5	2	2324
66	96	76025-037	2.5	134	104	2	2	2324
67	20	76036-054	3	142	52	3	2.5	2300
68	17	76036-043	2.5	157	52	3	2	2295
69	35	76013-044	1	128	94	3	3	2271
70	66	76025-001	1	122	124	2	3	2267

Table 3. (Continued)

Table Rank No.	Entry No.	*1 Origin	*2 Seedling Vigor	*3 Days to 50% Bloom	Plant Ht. cm	*4 Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
71	5	76041-006	3	140	80	2.5	1.5	2262
72	56	76015-095	3	142	72	3	2.5	2260
73	69	76025-007	3	121	82	2.5	2	2200
74	13	76036-027	2.5	152	70	3	1.5	2186
75	46	76015-007	2	138	82	2.5	2	2155
76	48	76015-028	2	114	90	3	2	2119
77	89	76025-029	2.5	139	100	2.5	2.5	2088
78	37	76013-109	3	128	75	3	3	2083
79	82	76025-022	3	136	88	3	2.5	2071
80	106	76025-046	3	128	82	3	2	2071
81	2	76041-001	3	142	61	3	2	2067
82	25	76036-071	2.5	158	50	3	2	2033
83	39	76013-160	2.5	138	76	3	2.5	2029
84	27	76036-078	2.5	141	68	3	2.5	2026
85	11	76036-026	3	148	64	3	2	2005
86	52	76015-070	2.5	132	76	3	2	1974
87	91	76025-031	2.5	128	105	3	2.5	1957
88	7	76036-006	3	145	50	3	2	1886
89	73	76025-011	3	145	50	3	2	1869
90	34	76013-030	2	136	74	3	3	1867
91	64	76016-035	2.5	128	60	3	1.5	1857
92	44	76013-191	2	120	80	2.5	2.5	1855
93	95	76025-036	2.5	138	108	2.5	2	1810
94	33	76036-165	2.5	156	68	3	1.5	1769
95	81	76025-021	3	131	70	3	2	1767
96	74	76025-013	3	156	57	3	2.5	1760
97	112	76025-053	3	136	111	2	2	1683
98	80	76025-020	3	129	90	3	2	1674
99	105	76025-045	2	127	103	2.5	2	1643
100	26	76036-076	2.5	148	62	3	1.5	1624
101	36	76013-052	1.5	126	78	3	2.5	1624
102	70	76025-008	3	146	34	3	3	1610
103	22	76036-058	3	148	65	3	1.5	1605
104	108	76025-048	3	137	120	2	2	1569
105	104	76025-044	2.5	129	102	2	2	1533

Table 3. (Continued)

Table Rank No.	Entry No.	*1 Origin	*2 Seedling Vigor	*3 Days to 50% Bloom	Plant Ht. cm	*4 Plant Agron. Rate	Head Agron. Rate	Grain Yield kg/ha
106	30	76036-105	2.5	153	54	3	1.5	1414
107	28	76025-087	3	156	62	3	2	1391
108	9	76036-013	3	147	39	3	2	1226
109	38	76013-118	2.5	122	78	3	2	1205
110	41	76013-171	3	140	71	3	1.5	1202
111	71	76025-010	3	132	69	3	3	1186
112	6	76041-007	3	153	70	3	2	1107
113	15	76036-038	2.5	156	50	3	3	1050

TEST NO. 77076

Early Maturity Advanced Yield Test

Test Description and Purpose:

This test contained 76 experimental sorghum genotypes with a local check entered 6 times and all replicated 4 times in a grain yield test. The purpose was to evaluate each experimental entry primarily for grain yield under limited moisture (semi-arid) conditions. The entries were also evaluated for other major phenotypic characteristics such as seedling vigor, days to 50% bloom, plant height, agronomic rating of plant and head and the threshing percentage of the dried harvested heads. These same evaluations were made of the local check genotype so that a judgment could be made for keeping the superior experimental genotypes and discarding those inferior to the local type.

Seed Source, Plot Size and Treatment:

The 76 experimental genotypes in this test came from four 1976 tests (76012, 76014, 76016, and 76019) and from several other miscellaneous sources. There were two United States type hybrids entered. These genotypes were in more advanced stages of testing and evaluation. All were combined into one test so that all could be compared with each other for selection of the best. These entries had been evaluated as rather early in maturity. Those considered to be later in maturity were entered in 77077.

The plot size was one row six meters long and .7 meter wide and replicated four times in a randomized complete block design. The preferred plot size would have been two row plots but the small size of the experimental farm and the long list of desired research to do dictated a compromise of small plots.

The test was grown under a somewhat limited moisture (semi-arid) regime in order to evaluate the entries for adaptation to droughty rain-fed growing conditions. The selected superior genotypes will be entered in an elite yield test in 1978.

Local varieties were included as checks or standards against which experimental entries were compared for retention or discard.

Results:

The averaged data from all four replications are presented in Table 4 for all characters measured. The entries are arranged in the table in the order of decreasing magnitude of their grain yields. A local check variety entered six times in the test ranked 7, 12, 14, 16, 27 and 31 in the test. These six entries of the same local check ranged in grain yield from 2962 down to 2429 kg/ha. This range of 533 kg/ha in performance of the same genotype is rather large indicating an undesirable amount of excess variability. Comparison data would not be too precise thus it would be advisable to retain genotypes below the averages of the checks since they may actually be superior to the checks.

The two hybrids from the United States ranked at or near the top of the test but experimental variety selections were equal to these hybrids. The two hybrids had undesirable plants for Yemen needs. The plants were too small and short. Not enough forage.

The other characteristics of seedling vigor, maturity, height and agronomic appearance of plant and head were also considered in the selection process.

A threshing percentage of grain from air dried harvested whole heads was calculated and is given in the table. The values are quite variable by genotype.

Table 4. Grain Yield and Other Agronomic Data on Early Maturity Sorghum Genotypes Grown in an Advanced Replicated Field Test (77076) on Bero Al Gohoume Farm at Sanaa, Yemen, 1977

Yield Rank No.	Entry No.	Entry	Seedling Vigor *1	Days To 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating *1	Head Agron. Rating *1	Head Thresh %	Grain Yield KG/HA *2	Remarks *3
1	84	RS 626	2.8	124	56	3	1	80.4	3607	H
2	10	75012-136	1.8	116	106	1.2	2	77.9	3526	S
3	35	76014-077	3	120	89	2.2	1.8	82.8	3152	S
4	85	RS 671	3	139	58	3	1	75.2	3110	H
5	53	75016-061	3	128	85	2	1.5	80.2	3064	S
6	31	76014-071	2.8	116	78	2.2	2.2	77	3038	S
7	68	LOCAL (F)	2	118	103	1.5	2	77.3	2962	CK
8	66	75016-183	2.8	114	92	2.2	2	79.7	2952	S
9	56	75016-113	3	124	104	2	2.2	77.1	2938	
10	44	75016-006	2.8	126	77	3	1.5	77.7	2929	
11	17	76014-021	3	118	61	3	2	75.9	2919	
12	25	LOCAL (B)	2.2	117	100	1.5	2.5	78.4	2895	CK
13	4	75012-120	2.8	113	71	2	2	79.1	2862	
14	37	LOCAL (C)	2.2	112	93	1	2	73.9	2829	CK
15	27	76014-066	3	118	74	2.5	2	79.4	2824	
16	32	76014-072	2.5	116	85	2.2	2	77.4	2776	
17	9	75012-135	2.8	122	100	1.8	2.2	78.5	2745	
18	13	LOCAL (A)	2	123	92	1.5	2	77.7	2712	CK
19	40	BAT 14[illegible]-71	3	121	95	2	2.2	80.4	2688	
20	51	75016-056	3	127	78	1.8	2	74.9	2674	

*1 Seedling Vigor, Plant Agronomic Rating, and Head Agronomic Rating: 1 = good, 2 = average, 3 = poor

*2 Plot = 1 row (6 m long X .7 m), 4 replications in a randomized complete block design

*3 H = Hybrid, S = Selected for testing in 1978, CK = Local check variety

Table 4. (Continued)

Yield Rank No.	Entry No.	Entry	Seedling Vigor	Days To 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating	Head Agron. Rating	Head Thresh %	Grain Yield KG/HA	Remarks
21	45	75016-010	3	128	70	2.8	2	75.4	2652	
22	64	75016-159	3	115	82	2.8	1.8	75.1	2652	
23	5	75012-131	2.8	111	100	2.2	2	77.7	2595	
24	77	CUOP-71-42-1	3	114	80	3	2	77.8	2557	
25	47	75016-017	3	128	58	3	1.2	75.9	2517	
26	72	CAN-2662-3	2.8	118	82	2.5	2.2	81.4	2514	
27	54	LOCAL (E)	1.2	129	110	1.5	2.2	77.4	2507	CK
28	30	76014-069	3	121	91	1.5	2.	78.7	2471	
29	63	75016-148	3	120	70	3	2.5	78.8	2457	
30	71	CUOP 2658-5	3	116	74	2.5	2	81.1	2440	
31	42	LOCAL (D)	1.8	118	96	1.2	2	74.5	2429	CK
32	73	S.-282	2.8	109	96	2	2	75.1	2405	
33	43	75016-001	3	129	76	2.8	1.5	76.4	2400	
34	12	1973 FAO	3	130	80	2	1.2	77.2	2395	
35	46	75016-016	2.8	138	79	2.8	1.8	74.9	2374	
36	33	76014-073	3	124	72	3	1.5	78.4	2362	
37	41	CUOP 71-24-1	2.8	114	80	2.2	1.8	77.6	2355	
38	3	75012-116	2.8	115	86	2.5	1.8	77.7	2355	
39	76	MAN-89-2	2.5	124	79	2	2	74.7	2348	
40	52	75016-057	3	134	84	2	1.2	75.7	2345	
41	11	75019	3	127	80	2.5	2.2	78.8	2324	
42	48	75016-020	2.8	120	99	2.2	2.2	82.5	2314	
43	50	75016-054	3	126	82	2.5	1.8	72.7	2300	
44	29	76014-068	3	117	78	3	2	76.4	2286	
45	74	S. 234	2.8	114	67	2.8	2.2	77.8	2279	

Table 4. (Continued)

Yield Rank No.	Entry No.	Entry	Seedling Vigor	Days to 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating	Head Agron. Rating	Head Thresh %	Grain Yield HG/HA	Remarks
46	60	75016-135	3	116	78	2.2	2	75.3	2260	
47	22	76014-037	3	117	98	1.8	1.5	75.9	2257	
48	8	75012-134	3	119	73	2.8	2	77.8	2255	
49	69	CUOR-71-111-1	3	112	66	2.8	2.5	75.2	2252	
50	18	76014-022	3	120	61	3	1.8	67.6	2233	
51	26	76014-064	2.8	128	88	2.2	1.8	77.4	2224	
52	6	75012-132	3	114	79	2.2	2	77.3	2224	
53	34	76014-075	2.8	116	72	2.5	2	78.6	2205	
54	81	CUOR-2660-6	2.8	114	86	2.8	2.5	88.5	2188	
55	1	75012-101	2.8	120	88	2.2	1.8	83.8	2181	
56	59	75016-133	2.8	120	74	2.2	2	81.9	2171	
57	61	75016-138	2.5	120	92	1.8	2.2	73	2157	
58	78	CUOR-71BORDS23	3	120	98	2	2	77.4	2157	
59	2	75012-114	3	124	86	1.5	2	77.1	2143	
60	36	76014-078	3	120	76	3	2.2	76.3	2133	
61	23	76014-062	3	126	60	3.0	1.5	73.5	2133	
62	65	75016-164	2.2	114	84	2	2	73.7	2076	
63	19	76014-027	2.8	118	60	3	1.8	67.8	2043	
64	67	75016-234	3	130	101	2.5	2.8	75	2014	
65	20	76014-028	3	126	72	2.5	2	76.8	2012	
66	15	76014-019	2.8	114	78	2.5	2	74	2010	
67	39	IS 509	3	129	100	1.8	2.2	75.7	1998	
68	55	75016-074	3	135	89	2.2	1.8	74.7	1976	
69	7	75012-133	3	116	68	2.8	2	76.3	1950	
70	62	75016-143	2.8	114	79	2.8	2.2	74.9	1943	

Table 4. (Continued)

Yield Rank No.	Entry No.	Entry	Seedling Vigor	Days to 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating	Head Agron. Rating	Head Thresh %	Grain Yield KG/HA	Remarks
71	58	75016-129	3	119	72	2.8	2	77.3	1940	
72	57	75016-126	3	116	54	3	2.2	75	1883	
73	21	76014-029	3	114	64	2.8	2.5	77.1	1876	
74	14	76014-018	3	119	88	2.2	2	71.4	1833	
75	24	76014-063	3	122	57	3	1.5	79.2	1757	
76	28	76014-067	2.8	121	78	3	2	73.9	1757	
77	49	75016-033	3	140	85	2.2	1.5	73.6	1643	
78	70	CUOR-71-120-1	3	119	66	2.8	2.2	70	1633	
79	16	76014-020	3	119	80	2.8	2.2	62.7	1457	
80	75	MAN-46-1	2.8	111	70	3	2.7	67.4	1445	
81	80	CUOR-2659-1	2.8	116	62	2.8	2.5	76.7	1376	
82	79	CUOR-71MER-8	3	120	63	3	2.5	61.5	1307	
AVERAGE OF LOCAL CHECKS			1.91	120	99	1.37	2.12	76.5	2721	

TEST NO. 77077

Late Maturity Advanced Yield Test

Test Description and Purpose:

This test contained 75 experimental sorghum genotypes with the local check variety entered 6 times and all 81 entries replicated four times in a grain yield test. The primary purpose was to evaluate each experimental entry primarily for grain yield under limited moisture (semi-arid) conditions These genotypes were in more advanced stages of testing and evaluation in the breeding program. The entries were also evaluated for other major phenotypic characteristics such as seedling vigor, maturity plant height, agronomic rating of plant and head and the threshing percentage of the dried harvested heads. These same evaluations were made of the local check genotype so that a judgment could be made for retention or discard of experimental genotypes when compared to the checks.

These entries were of a later maturity on the average compared to test 77076.

Seed Source, Plot Size and Treatment:

The 75 experimental genotypes in this test came from various sources, many from out of Yemen. "NES" stands for Near East Sorghum from ALAD. A number of entries came from test 75013. All of these entries from various sources were combined into one test so that all could be compared with each other for selection of the best.

The plot size was one row six meters long and .7 meter wide and replicated four times in a randomized complete block design. The preferred plot size was for two row plots but the small size of the experimental farm and the long list of possible research to do made a compromise of small plots necessary.

The test was grown under a somewhat limited moisture (semi-arid) regime in order to evaluate the entries for adaptation to droughty rain-fed growing conditions. The selected superior genotypes will be entered in an elite yield test in 1978.

Local varieties were included as checks or standards against which experimental entries were compared for retention or discard.

Results:

The averaged data from all four replications are presented in Table 5 for all characters measured. The entries are arranged in the table in an order of decreasing magnitude of their grain yields. A local check variety entered six times in the test ranked 19, 24, 35, 45, 46 and 48. These six entries of the same local check ranged in grain yield from 4388 down to 2990 kg/ha. This range of 1398 kg/ha in performance of the same genotype is quite large compared to other tests and also considering there were four replications involved. There seems to be more variability in this test than in others.

The top 9 yields are quite exessively high compared to other plot yields of this and other tests. An inspection of the adjustments for gaps and short plots indicated that the top 9 entries came through the season with only 10 to 25 percent of their stand. Adjustments of 75 to 90 percent had to be made. Obviously the adjustments were at too high a rate. These entries were not selected. If they could not develop a stand in the plot, perhaps they were not as well adapted as those genotypes that did develop a stand.

Fourteen entries marked "S" were selected for the 1978 Elite Yield Test.

Table 5. Grain Yield and Other Agronomic Data from a Late Maturity Advanced Yield Test (77077) at Sana'a, Yemen in 1977.

Yield Rank No.	Entry No.	Entry	Seedling Vigor	Days To 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating	Head Agron. Rating	Head Thresh %	Grain Yield KG/HA	Remarks
			*1			*1	*1		*2	*3
1	34	NES 633	2	151	70	2	1	74.5	8560	
2	43	NES 635	2	134	80	2	2.5	74.6	7879	
3	47	NES 858	2.66	143	79	2	1.33	79.8	7764	
4	73	NES 1815	2.50	144	54	2.67	1.33	76.3	7241	
5	51	NES 1146	2	148	57	2	1.33	65.1	7183	
6	71	NES 1792	3	148	60	2	1	77.1	6788	
7	56	NES 1460	2.50	140	66	2.33	2	70.5	6762	
8	75	NES 6998	2.5	139	66	3	1.5	74.9	6591	
9	39	NES 728	2	138	45	3	1	61.5	5760	
10	77	NES 7000	2.25	142	68	2.67	2	73	4998	S
11	54	NES 1421	2.75	136	54	3	1.67	74.7	4922	S
12	89	IS 858	3	129	79	2.33	2	75.3	4850	S
13	60	NES 1570	2.50	141	79	2	1	76.5	4819	S
14	44	NES 839	3	136	64	3	1.33	70.2	4812	
15	40	NES 746	2.75	148	62	2.67	1.67	72.7	4793	S
16	64	NES 1773	3	152	56	3	2	72.2	4398	S
17	59	NES 858	3	131	100	2.67	2	72.3	4398	
18	55	NES 1436	3	146	85	2	2	71.8	4398	
19	4	LOCAL	1.5	122	103	1.67	2.33	79.7	4388	CK
20	86	IS 410	3	145	48	3	1.33	71.6	4357	S

*1 Seedling Vigor, Plant Agronomic Rating, and Head Agronomic Rating: 1 = good, 2 = average, 3 = poor

*2 Plot = 1 row (6 m. long X .7 m), 4 replications in a randomized complete block design

*3 S = Selected for testing in 1978 CK = Local check variety

Table 5. (Continued)

Yield Rank No.	Entry No.	Entry	Seedling Vigor	Days To 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating	Head Agron. Rating	Head Thresh %	Grain Yield KG/HA	Remarks
21	69	NES 1789	2.5	148	62	3	2	80.4	4300	S
22	87	IS 825	2.75	148	64	3	1	70.4	4243	S
23	48	NES 864	3	131	75	2.33	2	76	4112	S
24	46	LOCAL	1	118	109	2	2.67	72.6	4048	CK
25	58	NES 1559	2.5	151	65	2.33	1	68.6	3993	S
26	45	NES 843	2.25	131	61	2	1	71.3	3952	S
27	84	NES P721	3	145	95	3	1	69.2	3900	S
28	80	NES 7003	2.25	155	58	3	1.33	68.8	3883	S
29	32	NES 50	2.75	138	70	2.5	2	76.5	3855	
30	83	NES 635	2.75	141	60	3	1.67	74.4	3745	
31	42	NES 799	2.75	144	80	3	1.67	71	3695	
32	1	IS 158	3	149	46	3	1.33	68.1	3674	
33	21	75013/380	2	124	96	2	1.67	78.7	3667	
34	66	NES 1782	2.75	151	51	3	1.33	77.2	3640	
35	70	LOCAL	1	124	102	1.67	2.67	75.3	3629	CK
36	78	NES 7001	2.75	138	84	2.33	1.67	73.6	3610	
37	81	NES 7004	2	154	53	3	1.5	69.6	3567	
38	38	NES 698	2.75	144	47	2.67	1.67	70.2	3524	
39	27	SANA 5	2	123	98	1.67	2.33	78.7	3500	
40	35	NES 634	2.66	143	53	3	2	61.9	3398	
41	79	NES 7002	2.25	137	51	3	1.33	71.5	3317	
42	72	NES 1803	2.50	141	63	3	1.67	73.2	3286	
43	3	IS 8355	3	151	54	2.67	1	72.8	3179	
44	37	NES 650	2.50	144	64	2.67	1.33	76.2	3160	
45	50	LOCAL	1.25	126	100	2	2.67	74.1	3031	CK

Table 5. (Continued)

Yield Rank No.	Entry No.	Entry	Seedling Vigor	Days To 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating	Head Agron. Rating	Head Thresh %	Grain Yield KG/HA	Remarks
46	22	LOCAL	1.25	120	112	1.33	2.33	77.8	3021	CK
47	6	75013-123	2.25	118	80	3	2	77.3	3002	
48	31	LOCAL	1.50	118	94	2.33	2.67	78.1	2990	CK
49	18	75013-366	2.50	126	80	3	1.67	70.4	2936	
50	67	NES 1785	2.25	151	65	2.67	1	67.7	2921	
51	26	SANA 4	2	125	88	2	1.67	69.7	2843	
52	5	75013-113	2.25	115	74	3	2.33	77.4	2795	
53	62	NES 1707	2.33	148	65	3	1.67	70.9	2748	
54	11	75013-227	2	120	87	2.33	2	77.2	2662	
55	90	IS 3673	2.50	134	78	2.67	1.33	71.7	2655	
56	9	75013-168	2.50	122	81	2.67	2	72.9	2619	
57	15	75013-333	2.25	117	74	3	2.33	73.6	2567	
58	85	IS 209	3	154	60	2.67	1	76.1	2564	
59	13	75013-319	1.75	116	94	3	2	77.1	2545	
60	30	SANA 8	1.50	132	92	2.67	2.67	64.6	2495	
61	76	NES 6999	2.50	155	57	3	1.67	62.5	2490	
62	41	NES 760	2.75	132	48	3	1.67	74.6	2488	
63	25	SANA 3	1.50	122	98	1.67	2.67	77.9	2462	
64	88	IS 858	2	152	60	3	1	65	2410	
65	17	75013-364	2.25	128	82	2	2	65.9	2371	
66	12	75013-313	2.50	121	90	2.67	2	75.2	2350	
67	36	NES 642	3	128	63	2.67	1.67	72.1	2305	
68	82	NES 7005	2.25	158	56	3	1.33	64.9	2290	
69	63	NES 1747	2.50	156	64	2.67	1.33	64.5	2231	
70	20	75013-378	2.50	123	99	2.67	2.33	75.9	2229	

Table 5. (Continued)

Yield Rank No.	Entry No.	Entry	Seedling Vigor	Days to 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating	Head Agron. Rating	Head Thresh %	Grain Yield KG/HA	Remarks
71	19	75013-372	2.25	126	81	3	2.33	75.4	2190	
72	10	75013-202	2	125	101	2.33	2.33	73.8	2138	
73	8	75013-167	2.25	121	80	2.67	2.33	69.6	2107	
74	7	75013-150	2.25	128	82	3	2	72.5	2026	
75	16	75013-346	2	128	68	3	1.67	70.7	2019	
76	28	SANA 6	2	122	97	2.33	2.67	71	1833	
77	14	75013-321	2	120	75	3	2	68.8	1755	
78	23	SANA 1	2	129	107	2.33	1.67	69.8	1743	
79	24	SANA 2	1.75	134	91	2.33	1.33	61.7	1686	
80	61	NES 1626	2.25	146	57	2.67	1.67	62	1617	
81	29	SANA 7	3	147	72	3	2.33	69	1310	
	Local Check Aver.	Average of Local Checks	1.25	116	103	1.83	2.55	76.2	3519	

TEST NO. 77078

Advanced Hybrid Generation Yield Test

Test Description and Purpose:

This test contained three generations (F_1, F_2 and F_3) of six commercial hybrids and a local check variety entered two times for a total of 20 entries. The primary purpose was to evaluate and compare the yields and phenotype among generations within hybrids and among hybrids. These are six typical United States type of grain hybrids of short height for combine harvest. The entries were evaluated for grain yield, seedling vigor, maturity, plant height, and agronomic rating of plant and head.

Seed Source, Plot Size and Treatment:

Seed of the six commercial hybrids came from the United States. The F_1 had been grown and harvested at Sana'a in 1975, the F_1 and F_2 were grown in 1976 (76020). Seed from the F_2 plants was harvested in 1977 to produce the F_3 generation. Remnant seed of the F_1 and F_2 generations had been saved to plant and compare with the F_3.

The plot size was two rows, six meters long and .7 meter between rows. There were four replications in a randomized complete block design.

The test was not treated to a limited moisture regime to simulate semi-arid conditions.

The local variety was included as a check (in two entries) as a standard against which to compare the other experimental entries.

Results:

All data are given in Table 6 and Table 7.

The grain yields were interesting in that within hybrids the F_2 generation ranked first in 4 out of the 6 hybrids (Table). The F_1

and F_3 generations ranked first in the other two hybrids. The F_1 generation ranked 2nd or in the middle in 5 out of the 6 hybrids. The F_3 generation ranked 3rd or last in 4 out of the 6 generations.

This would indicate perhaps a gain of yield in the F_2 or at least not a loss. The yield apparently did start to fall in the F_3 generation.

The maturity of days to 50% bloom did not seem to vary much among generations within hybrids or among hybrids. We can then conclude that maturity did not seem to be shifted by succeeding generations.

The average plant height did seem to increase slightly in the F_2 over the F_1. The height of the F_3 generation increased quite a bit over the F_2 giving greater forage potential.

The head phenotype seemed to deteriorate in the F_3 by becoming smaller. This also was reflected in a lower grain yield in the F_3 generation.

It appears that Yemen growers could plant hybrid F_1 seed, save some of the harvested seed to plant the next year (F_2) and expect to receive about the same grain yield with a little more height. Seed of this crop if planted a third year would give a relatively lower grain yield but taller plants and more forage. This would have to be in areas of good rainfall or irrigation as these hybrids are not as drought tolerant as Yemen local lines.

Table 6. Grain Yield and Other Agronomic Data on Advanced Generations of Various Commercial Grain Sorghum Hybrids Grown in a Replicated Field Test (77078) on Bero Al Gohoume Farm at Sanaa, Yemen, 1977

Yield Rank No.	Entry No.	Entry	Seedling Vigor *1	Days To 50% Bloom	Plant Ht. Cm.	Plant Agron. Rating *1	Head Agron. Rating *1	Grain Yield KG/HA *2
1	4	NK 233 F1	3	124	48	3	1	4687
2	9	PIONEER 866 F2	3	145	58	3	1	4649
3	2	DD 50 F2	3	133	54	3	2	4443
4	12	PIONEER 894 F2	3	133	41	3	2	3632
5	8	PIONEER 866 F1	2.2	132	52	3	1	3551
6	10	PIONEER 866 F3	2.2	131	74	2.7	2.2	3358
7	3	DD 50 F3	2.7	119	78	2.7	2.5	3355
8	7	LOCAL CHECK	1	119	106	2.5	3	3332
9	16	PIONEER 8681 F2	2.7	130	55	3	1	3207
10	20	RS 671 F3	2.7	128	74	2.7	2.5	3086
11	15	PIONEER 8681 F1	2.5	131	41	3	1	2994
12	17	PIONEER 8681 F3	3	133	63	3	2.2	2767
13	11	PIONEER 894 F1	2.5	119	40	3	2	2752
14	5	NK 233 F2	2.2	131	51	3	1.5	2749
15	6	NK 233 F3	2.5	130	46	3	2	2744
16	14	LOCAL CHECK	1	119	98	2.7	3	2708
17	18	RS 671 F1	3	137	56	3	1	2692
18	1	DD 50 F1	2.7	122	45	3	1.5	2691
19	13	PIONEER 894 F3	3	128	66	3	2.5	2438
20	19	RS 671 F2	2.7	144	59	3	1.2	2290

*1 Seedling Vigor, Plant Agronomic Rating, and Head Agronomic Rating: 1 = good, 2 = average, 3 = poor

*2 Plot = 2 rows (6 m long X .7 m), 4 replications in a randomized complete block design

Table 7. Reaction of Grain Yield, Height and Head Agronomic Rating in the F_1, F_2 and F_3 Generations in Six Hybrid Sorghums (Test No. 77078)

	Hybrid Sorghums					
Grain Yield Rank	DK DD50	NK 233	Pioneer 866	Pioneer 894	Pioneer 8681	RS 671
1	F_2	F_1	F_2	F_2	F_2	F_3
2	F_3	F_2	F_1	F_1	F_1	F_1
3	F_1	F_3	F_3	F_3	F_3	F_2
Height cm						
F_1	45	48	52	40	41	56
F_2	54	51	58	41	55	59
F_3	78	46	74	66	63	74
Head Agronomic Rating						
F_1	1.5	1.	1	2	1	1
F_2	2.	1.5	1	2	1	1.2
F_3	2.5	2.	2.2	2.5	2.2	2.5

TEST NO. 77079

Pest Resistance Nursery

Test Description and Purpose:

This test contained 23 sorghum genotypes, listed in Table 8, which were selected and the seed supplied by ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). This test was also distributed to several other countries by ICRISAT. A local check variety was entered against which the other entries could be compared. The entries in the test represented resistant and susceptible genotypes for several insects so that a measure of certain insect population levels could be determined locally by readings on the particular entries.

This test was number 5 from ICRISAT which was sent out in 1976 for planting in 1976. Such tests always arrived after planting was complete for the year so the seed had to be carried over to the next year.

Seed Source, Plot Size and Treatment:

The seed was supplied by ICRISAT as explained above. The test was planted in 4 row plots (.7m between rows) 3m long. We would have preferred 6m long plots but a critical shortage of field research land area dictated reduction of plot sizes to a much smaller size. The entries were replicated four times in a randomized complete block design.

This test was not to be subjected to moisture stress since we were looking at other things than yield under semi-arid conditions.

Results:

A very poor stand was obtained in this test. There were practically no plants from some entries. Many tried to emerge but soon died. It appeared to be more of a problem of lack of adaptation to the local environment by the genotypes rather than viability of the seed. This same sort of situation has occurred before with such tests of exotic materials being introduced into this environment.

No meaningful data could be determined from this test so it was completely abandoned. The one result that is evident is that very few sorghum genotypes can be introduced into the local environment and perform very well at all. The local types with thousands of years of adaptation and selection are still superior in their home environment.

Table 8. Pedigrees of Twenty-Four Sorghum Genotypes in a Pest Resistance Nursery Test (Experiment #5 - 1976) Received from ICRISAT and planted at Sana'a, Yemen in 1977 (Test 77079).

Entry No.	*1, *2 Pedigree	Entry No.	*1, *2 Pedigree
1	IS 5604	13	IS 4664
2	IS 1054	14	IS 3962 x WABC 4121
3	IS 1082	15	210-P-4-1-1
4	IS 3962	16	CS 3541
5	IS 5642	17	IS 2501C
6	EN 3337-1	18	S-GIRL-MR-1
7	IS 5604 x 23/2	19	V-70-1-1-1
8	IS 2312	20	E-302
9	EN 3255	21	E-303
10	IS 5383	22	SERENA
11	EN 3363	23	SWARNA
12	EN 3332-2	24	LOCAL CHECK

*1 Plot size - 4 rows (.7m between rows) x 3m long.
Four replications.

*2 Planted dry on 27 April and irrigated on 30 April 1977.

TEST NO. 77080

Experimental Hybrid Yield Test

Test Description, Seed Source and Purpose:

There were 49 entries in the test composed of the following types of genotypes: 30 experimental hybrids from pollination of random segregating steriles with local pollen in 1976 in tests 76013 (selections from segregating generations of USDA bulks of which the pedigree and history is not clear), 76026 and 76027 (selections from the F_2 segregating generations of imported hybrids); 13 variety type selections from tests 76032 (segregating generations of USDA bulks of which the pedigree and history is not clear), 76035 (selections from 75013), 76041 (unreplicated test of high yielding lines); four introduced lines and hybrids; and a local check entered two times.

The purpose was to evaluate the local performance of hybrids involving local germplasm.

The parentages and all data are presented in Table 9.

Plot Size and Treatment:

The plot size was 1 row (.7m between rows) x 6m long. There were three replications in a randomized complete block design.

The test was not submitted to limited irrigation as was done for some other tests.

Results:

The grain yields of some of the experimental hybrids were more than double the yield of the local check. The variety types were interspersed among the hybrids in a rather uniform distribution of rank. It would appear that the use of local germplasm in a hybrid production program would give good performing hybrids. There are also very low performing hybrids.

The better performing hybrids given here could not be duplicated because the hybrid crosses were made on random segregating steriles. There was no propagation system for the steriles. The local genotype pollinator was apparently an "R" line if the crosses were made on actual steriles.

All maturities of these hybrids were all in the desired range of 120 to 140 days.

The heights of the hybrids were generally in the vicinity of 100 cm or better which is satisfactory. Another 25 cm would be good. The variety type entries were generally too short to give the desired forage.

The data show that the plant and head agronomic ratings were relatively poor.

Table 9. Grain Yield and Other Agronomic Data from an Experimental Hybrid Yield Test (77080) at Sana'a, Yemen in 1977.

Rank No	Entry No	*1 Origin	*2 Seedling Vigor	*3 Days to 50% Bloom	Plant Ht cm	*4 Plant Agron Rate	Head Agron Rate	Grain Yield kg/ha
1	19	760130125 x Local	1.67	128	96	2.33	2	3974
2	7	7602704 x Local	3	138	79	2.33	2	3864
3	29	760130203 x Local	1.67	127	107	2	2	3719
4	28	760130201 x Local	1.33	113	95	3	2.67	3360
5	3	76026032 x Sib	1.67	127	113	1.25	1.67	3314
6	9	7602706 x Local	2	128	117	1.25	1.33	3281
7	16	76013089 x Local	2	131	118	2	1.33	3212
8	44	76035063	2.33	122	71	3	3	3212
9	1	7602601 x 76026017	2	138	96	2.33	1.67	3150
10	40	76035019	2.67	126	73	3	3	3133
11	38	76035007	2.67	126	91	3	2.67	3067
12	20	760130130 x Local	2.33	117	105	2.67	2.67	3057
13	8	7602705 x Local	2.67	130	106	2	1.33	2960
14	30	760130204 x Local	1	134	123	1.67	2.33	2960
15	41	76035027	3	131	86	3	2.67	2936
16	24	760130193 x Local	2	126	117	2	1.67	2819
17	6	7602703 x Local	2.33	124	113	2	1.33	2805
18	22	76013153 x Local	1.33	119	99	2.33	1.67	2750
19	46	76032027	2.67	135	82	3	3	2717
20	45	76032014	2.67	133	65	3	3	2683
21	15	76013085 x Local	2	127	113	2	1.67	2679
22	37	76035006	2.33	146	96	2.67	2	2633
23	2	76026032 x Local	1	115	111	2	2.33	2626
24	42	76035037	1.67	116	109	2.67	2.33	2548
25	23	760130183 x Local	2	118	103	2.67	2.33	2486
26	26	760130195 x Local	2	128	125	1.67	1.67	2483
27	43	76035060	2.67	124	59	3	3	2438
28	33	RS671	3	139	48	3	1	2436
29	13	76013018 x Local	2	123	92	2.67	2.67	2376
30	27	760130198 x Local	1.33	115	98	3	2.33	2319
31	10	7601306 x Local	3	125	119	1.25	1.67	2274
32	39	76035014	2.67	136	83	3	3	2267
33	18	760130118 x Local	2.67	130	57	3	3	2250
34	25	760130194 x Local	2	123	97	2	2	2198
35	17	760130117 x Local	3	134	79	3	2.33	2176

*1 Plot size = 1 row (.7 m between rows) x 6 m long. Three replications.
*2 Seedling vigor rating scale: 1=good, 2=average, 3=poor.
*3 Planted dry on 27 April, irrigated on 28 April, 1977.
*4 Agronomic rating scale of mature plants and heads: 1=good, 2=average, 3=poor.

Table 9. (Continued)

Rank No	Entry No	*1 Origin	*2 Seedling Vigor	*3 Days to 50% Bloom	Plant Ht cm	*4 Plant Agron Rate	Head Agron Rate	Grain Yield kg/ha
36	47	76041002	2	113	100	2.67	2.67	2171
37	11	76013010 x Local	2.67	123	72	3	3	2121
38	5	7602702 x Local	2.67	117	116	2	1.33	2117
39	32	RS626	2.67	133	49	3	1	2062
40	48	76041003	2.67	128	108	2.33	1.33	2029
41	36	Local	1.33	125	97	2.67	3	1943
42	4	7602701 x Local	3	137	38	3	2	1902
43	21	760130147 x Local	2.33	124	82	3	3	1879
44	34	168	2.33	151	48	3	3	1798
45	31	Local	2	121	109	3	3	1698
46	35	CS-3541	3	136	58	3	3	1560
47	49	76041006	3	90	52	3	3	1538
48	12	76013014 x Local	2	117	103	2.67	2.33	1433
49	14	7601370 x Local	3	125	72	3	3	1162

TEST NO. 77081

Experimental Hybrid Genotype Observation Test

Test Description, Seed Source and Purpose:

There were 82 entries in this test. The entries and all data collected are listed in Table 10. Sixty six entries were from random steriles from tests being pollinated with local pollen. These random sterile heads were from tests 76013, 76032, 76035, and 76041. These tests are described in 77080. Fourteen other hybrids on the same sources of steriles had sib or other pollinators. A local check was entered twice. There was insufficient seed of these crosses to warrant a yield test so this was an unreplicated test for observation only.

Plot Size and Treatment:

The plot size was 1 row (.7 m between rows), 6 m long and unreplicated. This test was not subjected to a minimum irrigation regime.

Results:

The collected data from this test is given in Table 10. The data are ranked by single plot yields.

There is a considerable range in observed seedling vigor scores.

All maturities seem to be within a favorable range.

About two thirds of the plant height were 100 cm or more which is desirable. Less than 100 cm is undesirable. The shorter heights tended to go with the lower unreplicated plot yields.

The better plant and head agronomic ratings appeared to go with the higher single plot yields.

The grain yields of these single plots show a rather large range of from 11,667 kg/ha down to 274. It appears that the 4 or 5 top entries (by yield) are unreasonable probably due to over-correction for short plot or bird damage.

The local check ranks 32 and 50 in the test indicating the potential for hybrid performance over local varieties regarding grain yield in non-drought situations.

Table 10. Unreplicated Grain Yield and Other Agronomic Data from Experimental Hybrid Genotypes in an Observation Test (77081) at Sana'a, Yemen in 1977.

Table Rank No.	Entry No.	*1 Pedigree	*2 Seedling Vigor	*3 Days to 50% Bloom	*4 Plant Ht. cm	*5 Plant Agron. Rate	Head Agron. Rate	Grain Yield hg/ha
1	16	76013046 x Local	2	120	147	1	1	11667
2	15	760130195 x Local	1	121	135	1	1	7803
3	4	7601307 x Local	3	120	110	3	3	7464
4	7	76013020 x Local	2	129	125	2	2	6086
5	2	7601304 x Local	1	114	100	2	1	5895
6	6	760130200 x Local	2	19	120	2	1	5712
7	12	76013031 x Local	1	122	120	2	1	5683
8	50	760130178 x Local	1	118	147	2	1	5586
9	10	76013027 x 76026032	1	117	100	2	2	5519
10	32	760130117 x 76026032	2	123	130	2	2	5050
11	38	760130126 x 76026032	2	120	117	3	2	4841
12	72	76035061 x Local	1	121	115	2	2	4514
13	55	760130192 x Local	2	133	140	2	1	4286
14	24	76013084 x Local	2	119	115	2	1	4281
15	52	760130181 x Local	1	123	150	2	2	4210
16	33	760130119 x Local	1	120	130	2	2	4200
17	11	76013030 x Local	2	120	117	2	2	4041
18	43	760130142 x Local	1	117	130	1	2	3976
19	54	760130186 x Local	2	123	150	2	2	3967
20	27	760130109 x 76026033	2	131	118	1	2	3952
21	65	76035024 x Local	2	131	120	2	2	3902
22	42	760130140 x Local	2	119	150	1	2	3893
23	39	760130127 x Local	2	128	130	2	1	3872
24	49	760130167 x Local	2	120	100	2	2	3798
25	36	760130124 x 76026032	3	132	120	3	2	3726
26	23	76013078 x Local	2	125	105	3	2	3719
27	47	760130158 x Local	1	115	110	2	1	3629
28	31	760130116 x Local	2	127	110	1	1	3619
29	46	760130156 x Local	1	116	120	2	2	3514
30	45	760130148 x Local	2	118	120	2	2	3452

*1 Plot size = 1 row (.7 m between rows) X 6 m long, unreplicated.
*2 Seedling vigor rating scale: 1=good, 2=average, 3=poor.
*3 Planted dry on 27 April and irrigated on 30 April 1977.
*4 Plant height from ground level to the top of the head of an average plant in the plot row.
*5 Agronomic rating scale of mature plants and heads: 1=good, 2=average, 3=poor.

Table 10. (Continued)

Table Rank No.	Entry No.	*1 Pedigree	*2 Seedling Vigor	*3 Days to 50% Bloom	*4 Plant Ht. cm	*5 Plant Agron. Rate	Head Agron. Rate	Grain Yield hg/ha
31	34	760130123 x Local	2	134	140	1	1	3388
32	13	Local	2	119	145	2	2	3331
33	25	76013097 x Local	2	124	117	3	2	3317
34	28	760130112 x 76026032	3	126	110	2	2	3302
35	29	760130112 x Local	3	116	100	2	2	3302
36	18	76013055 x Local	1	121	110	2	2	3241
37	75	76032012 x Local	1	141	150	2	2	3195
38	79	76041001 x Local	1	132	100	2	1	3195
39	41	760130138 x Local	1	118	137	2	2	3193
40	30	760130114 x Local	1	121	110	2	2	3167
41	57	760131193 x 7602632	2	142	100	2	2	2931
42	40	760130128 x S1B	1	122	117	2	2	2874
43	61	76035001 x Local	3	123	80	3	2	2764
44	51	760130180 x Local	2	125	140	1	2	2674
45	19	76013067 x S1B	3	122	85	3	2	2500
46	1	7601302 x Local	2	111	110	3	3	2393
47	21	76013071 x Local	3	118	60	3	2	2350
48	69	76035055 x Local	2	131	85	3	3	2288
49	76	76032031 x Local	3	135	88	3	2	2288
50	37	Local	3	131	130	2	3	2226
51	56	760130191 x Local	3	120	90	3	2	2193
52	64	76035024 x Local	3	121	88	3	3	2191
53	60	760130106 x Local	2	137	120	2	2	2038
54	59	760130105 x Local	2	134	100	3	2	2021
55	58	760131194 x 76026032	2	134	107	3	2	1983
56	9	76013027 x 76026032	3	118	88	3	2	1952
57	73	76035065 x Local	3	134	97	2	2	1952
58	3	7601305 x Local	3	120	110	3	3	1917
59	5	76013019 x Local	3	122	88	3	3	1829
60	35	760130124 x 76026032	3	135	75	3	2	1819
61	67	76035029 x Local	3	128	110	2	2	1764
62	53	760130183 x S1B	3	121	110	3	2	1741
63	17	76013053 x S1B	3	133	87	3	2	1700
64	77	76032040 x Local	3	137	60	3	2	1602
65	82	76041008 x Local	3	158	60	3	2	1476

Table 10. (Continued)

Table Rank No.	Entry No.	*1 Pedigree	*2 Seedling Vigor	*3 Days to 50% Bloom	*4 Plant Ht. cm	*5 Plant Agron. Rate	Head Agron. Rate	Grai Yiel hg/h
66	63	76035020 x Local	3	132	105	3	3	1469
67	8	76013023 x Local	2	119	80	3	3	1402
68	66	76035025 x Local	3	135	97	3	3	1402
69	70	76035057 x Local	3	120	65	3	3	1331
70	14	76013042 x Local	3	131	60	3	2	1295
71	22	76013074 x Local	3	129	50	3	3	1226
72	62	76035011 x Local	3	133	88	3	3	1207
73	78	76032044 x Local	3	141	88	3	2	1176
74	68	76035046 x Local	3	133	100	3	3	1152
75	44	760130144 x Local	3	121	45	3	3	1117
76	48	760130159 x Local	3	119	48	3	3	1098
77	71	76035058 x Local	2	133	78	3	3	1045
78	26	760130109 x Local	3	135	88	3	3	1002
79	74	76035070 x Local	3	143	100	3	2	976
80	80	76041005 x Local	3	154	80	3	3	274
81	20	76013068 x Local	3	143	-	-	-	-
82	81	76041007 x Local	3	-	-	-	-	-

TEST NO. 77082

Early Maturity Head-to-Row Selections

Test Description and Purpose:

This test consisted of 342 early maturity single head selections grown out in single unreplicated plot rows. A local check variety was entered 3 times. The purpose was to visually evaluate each of these single head selections on a row basis for potential as a dual purpose grain and forage variety. The agronomic characteristics of maturity, plant height of one meter or more, sturdy stalk, leafiness and a good grain head with medium to large seed size were to be considered.

Seed Source, Plot Size and Treatment:

The head selections for this test came from 76019 (off-type head selections from 1975) and 76026 (no records were available describing this test).

Plot size was one row, six meters long and .7m between rows. Three to four heads of typical plants from selected rows were to be selfed at tip bloom. The test was to be grown under a somewhat limited moisture or irrigation regime in order to enhance the expresssion of drought tolerance or susceptibility. Selected genotypes were scheduled to be grown in a preliminary yield test in 1978.

Results:

This test was planted in field E in an area which ultimately could not be irrigated. It was planted dry on May 15, 1977. A moderate amount of rain fell on May 22 and 23 which sprouted the seed. Most seedlings emerged and then dried up and died from lack of rain or irrigation to supply any moisture. The irrigation system proved inadequate to reach this field. Normally a dryland farmer would not plant as we did, unless

he had subsoil moisture. We relied on irrigation to replace the rain but it could not be done so the test was lost. No entry list is presented since it would have no value.

TEST NO. 77083

Late Maturity Head-to-Row Selections

Test Description and Purpose:

This test consisted of 338 late maturity single head selections grown out in single unreplicated plot rows. A local check variety was entered four times. The purpose was to visually evaluate each of these single head selections on a row basis for potential as a dual purpose grain and forage variety. The agronomic characteristics to be considered for selection were maturity, plant height of one meter or more, sturdy stalk, leafiness, and a good grain head with medium to large seed.

Seed Source, Plot Size and Treatment:

The head selections for this test came from 76026 but no records existed in the 1976 field book describing this test as to what it was or where it came from.

Plot size was one row, 6 meters long and .7 meters between rows. Three to four heads of typical plants from selected rows were to be bagged (selfed) at tip bloom. The test was to be grown under a somewhat limited moisture regime in order to enhance the expression of drought tolerance or susceptibility. Selected genotypes were to be entered in a preliminary yield test in 1978.

Results:

This test was planted in field E in an area which ultimately most of it could not be irrigated. It was planted dry on May 15, 1977. A moderate rain on May 22 and 23 germinated most of the seed. Most of the emerged seedlings eventually died from lack of further rain or irrigation. The irrigation system proved inadequate to reach most of this test. Part of the test was able to be supplied with moisture and 17 selections were made and are listed in Table 11.

Normally a dryland farmer would not plant as we did unless he had good subsoil moisture. We relied on being able to supply moisture through irrigation but this failed so most of the test was lost. Only the pedigrees are presented for the selected lines as discarded lines are of no value.

Table 11. Agronomic Data from Head-to-Row Grown in Test 77083 at Sana'a in 1977 and Selected for Further Evaluation in 1978.

Table No.	Test Entry No.	*1, *2 Pedigree	Origin
1	104	76026019-2	76026
2	108	" -6	"
3	109	" -7	"
4	110	" -8	"
5	111	" -9	"
6	114	" -12	"
7	115	" -13	"
8	117	76026020-2	"
9	124	" -9	"
10	127	76026021-2	"
11	129	" -4	"
12	136	76026023-1	"
13	141	76026025-2	"
14	143	" -4	"
15	145	" -6	"
16	148	" -9	"
17	149	" -10	"

*1 Plot size: 1 row (.7m between rows) x 6m long.
*2 Planted dry on 15 May 1977, irrigated on 17 May 1977.

TEST NO. 77084

Preliminary Yield Trial of Miscellaneous
Experimental Genotypes

Test Description, Purpose and Seed Source:

This test consisted of 148 different experimental genotypes and a local check variety entered 6 times. The 154 total entries were replicated two times in a randomized complete block design.

The purpose was to evaluate each entry for yield of grain and for the other agronomic characteristics of maturity, height (one meter or more), a sturdy and leafy stalk, and large head with large seed.

The seed sources for the entries in this test came from:

76013 - Selections from USDA Bulks (?)
76015 - F_4 selections from an F_3 population
76025 - Nutritional Quality Yield Test from Purdue
76026 - No written history of this test
76029 - Advance Y.T. - from 74009 Adv. Y.T.
76032 - Selections from USDA Bulks (?)
76039 - Test type unknown
76041 - Unreplicated test of high yielding lines

These selections had been made the year before (1976) so an attempt was made here in this test to follow through with an evaluation. The entries with their pedigrees and all data are given in Table 12.

Plot Size and Treatment:

The plot size was 1 row (.7 m between rows), 6 meters long. The plots were subjected to a minimum irrigation regime in an attempt to simulate semi-droughty rainfed conditions.

Results:

The data in Table 12 are arranged in descending order of grain yield of the entries. The six local check entries rank 4, 12, 19, 22, 41, and 44 out of 154. The local check performs quite near the top of the list so quite a large number of the entries could be discarded.

The local check entries range in grain yield from 4133 kg/ha down to 2512. This wide range of 1921 kg/ha is very large indicating considerable

variability within the test and also that entries below the local check level may actually possess better potential than indicated. The one top entry seems to be quite unrealistic in yield due to some adjustment irregularity.

The days to 50% bloom of about 120 to 140 days is typical and desirable. The 68 days to 50% bloom of the top entry seems very unusual and probably unrealistic.

Plant heights of 100cm or more are desirable to shorter heights in order to give more forage potential.

The plant and head agronomic ratings show considerable variation among entries with the lower yielding entries showing lower ratings (higher score values).

There is considerable variation among treshing percentages of the dried harvested heads.

Seven entries were selected for the advanced yield test in 1978.

Table 12. Grain Yield and Other Agronomic Data from Experimental Genotypes in a Miscellaneous Preliminary Yield Trial (77084) at Sanaa, Yemen in 1977.

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
1	114	76015-083	3	68	89	1.5	1.0	76.7	5726
2	52	76026-033	2	126	98	2	1.5	81	4443
3	51	76026-032	2	116	98	2.5	1.5	75.6	4250
4	55	Local (B)	1.5	126	98	2	3	76.4	4133
5	43	76026-023	2.5	134	106	1.5	2	79.6	3814
6	34	76026-014	2.5	130	110	2	1.5	78.7	3748
7	141	76013-029	3	114	79	3	2	78.5	3681
8	45	76026-025	2.5	129	108	1.5	2	80.8	3657
9	44	76026-024	2	134	132	1	2	81.9	3510
10	39	76026-019	2	147	109	2.5	2.5	72.1	3310
11	56	76026-040	2	137	135	1	2	80	3262
12	148	Local (F)	1.5	126	105	2	2	76.8	3245
13	65	76026-061	2	124	118	2	2	79.8	3217
14	106	76015-067	3	128	64	3	1	74.2	3095
15	147	76013-140	3	120	88	2.5	2.5	78.3	3081

*1 Plot Size = 1 row (.7 m between rows) X 6 m long, replicated two times.

*2 Planted dry on 27 April, irrigated on 28 April, 1977.

Table 12. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
16	78	76026-076	2	122	98	2.5	2	77.8	3067
17	95	76015-033	2	134	58	3	1.5	80.6	3062
18	47	76026-027	2.5	125	122	2	2	69.3	3048
19	113	Local (D)	2	131	98	3	3	79	3014
20	153	76032-095	3	134	98	3	2	77.2	3012
21	14	76025-040	2	121	89	2	2	75.4	3005
22	23	Local (A)	2	118	89	2.5	3	75.5	2962
23	139	76013-021	3	130	75	2.5	2	81.7	2912
24	60	76026-049	2	114	108	2.5	2	79.7	2862
25	69	76026-065	2.5	123	92	2.5	2	80.7	2860
26	35	76026-015	2.5	136	83	2	1.5	76.7	2824
27	137	76013-015	2	124	72	2.5	2	82.6	2771
28	93	76015-030	2.5	122	82	2.5	1.5	71.6	2757
29	70	76026-066	2	126	88	2	1.5	79.2	2721
30	49	76026-029	2	134	135	2	2	86.2	2714
31	59	76026-047	2.5	130	115	2.5	2.5	78.3	2700
32	98	76015-048	3	116	68	3	3	76.4	2688
33	22	76039-034	3	124	74	3	2	80.3	2660
34	3	76025-017	3	134	90	3	3	73.5	2650
35	18	76025-045	1.5	133	125	1.5	2	80.2	2638

Table 12. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
36	54	76026-039	1	125	89	2	1.5	77	2626
37	48	76026-028	2.5	117	103	2.5	2	78	2605
38	62	76026-052	3	130	102	1.5	2	72.6	2605
39	115	76015-085	3	135	73	2.5	1.5	83	2591
40	37	76026-017	2	134	102	2	2	77	2574
41	133	Local (E)	2	131	93	3	2.5	75.6	2560
42	111	76015-081	3	126	90	3	2.5	79.3	2557
43	67	76026-063	2.5	122	119	2	2	75.2	2519
44	79	Local (C)	1.5	126	78	2.5	3	73.4	2512
45	140	76013-028	3	130	80	2.5	1.5	76.5	2495
46	127	76015-123	2.5	146	116	1	1.5	73.5	2469
47	68	76026-064	3	114	89	3	3	69.8	2448
48	131	76015-127	3	134	82	2.5	2.5	79	2393
49	104	76015-062	2.5	134	69	3	2	68.6	2386
50	149	76032-020	3	138	88	2.5	2	78.3	2362
51	46	76026-026	2	131	132	2	2	77.8	2345
52	28	76026-005	2	132	98	2.5	2.5	84.8	2291
53	71	76026-067	2	132	102	2.5	2	79.9	2252
54	9	76025-023	3	134	95	2.5	2.5	76.4	2236
55	77	76026-075	3	131	55	3	1.5	70.6	2236

Table 12. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
56	26	76026-003	2.5	125	82	3	2	82.6	2224
57	64	76026-060	2.5	134	111	2.5	2.5	83.9	2217
58	41	76026-021	2.5	125	80	3	2	76.7	2205
59	143	76013-046	3	119	58	3	3	74.1	2205
60	119	76015-095	3	130	74	3	2	82.4	2141
61	100	76015-056	3	115	62	3	2.5	80.7	2138
62	25	76026-002	3	132	115	2.5	2	68.9	2131
63	132	76015-061	3	132	55	3	2.5	71.6	2129
64	138	76013-018	3	124	82	3	2.5	76.8	2129
65	42	76026-022	2.5	126	82	3	2	78.8	2126
66	24	76026-001	2	112	69	3	2.5	77	2117
67	58	76026-044	2	132	125	2.5	2	66.3	2079
68	142	76013-038	3	128	86	2	1.5	72.8	2071
69	21	76029-001	2.5	126	102	2.5	2.5	82.6	2045
70	101	76015-057	3	118	50	3	3	87	2038
71	17	76025-043	2	118	103	2	2.5	66.4	2029
72	15	76025-041	2	136	86	2	2	77.8	2019
73	120	76015-100	3	138	74	3	1.5	80.2	2012
74	99	76015-054	3	118	36	3	2	78	2005
75	129	76015-125	2.5	138	98	2	1.5	69.3	1991

Table 12. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
76	150	76032-022	3	124	88	3	3	75.5	1964
77	57	76026-041	3	122	94	3	2	85.6	1950
78	80	76015-003	3	145	62	2.5	2.5	85.1	1948
79	32	76026-011	2	126	59	3	2	76	1938
80	38	76026-018	2	143	100	1.5	2	76.9	1931
81	89	76015-020	3	127	64	3	2	72	1929
82	107	76015-072	2.5	136	72	3	2	76	1929
83	53	76026-038	2	138	95	3	3	71.7	1893
84	19	76025-047	2.5	138	104	2	2	79.3	1869
85	76	76026-074	1.5	125	125	1.5	2.5	75.5	1862
86	134	76013-004	3	134	78	3	2	81	1850
87	91	76015-024	3	136	75	3	3	77.1	1821
88	66	76026-062	3	138	110	2	2.5	66.1	1819
89	13	76025-031	2.5	124	104	2	2.5	70.4	1814
90	96	76015-034	3	120	69	3	3	80.6	1800
91	123	76015-114	3	137	54	3	1.5	67.7	1769
92	116	76015-087	3	132	92	3	2	67.2	1767
93	12	76025-027	2.5	126	118	2	2.5	73.1	1760
94	36	76026-016	3	142	108	2.5	2.5	70.2	1760
95	73	76026-069	2.5	142	102	2.5	2	82.9	1760

Table 12. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
96	125	76015-117	2.5	146	102	2	2	75.9	1750
97	10	76025-024	3	130	90	2	2	78.7	1741
98	85	76015-014	3	148	39	3	2	88.5	1741
99	8	76025-022	3	144	83	3	2.5	54.8	1691
100	50	76026-031	2.5	135	122	2.5	2.5	81	1681
101	74	76013-0194	3	117	48	3	3	68.9	1669
102	154	76041-002	3	143	65	3	2	65.5	1664
103	97	76015-035	3	136	56	3	2	72.1	1662
104	72	76026-068	2	134	92	3	3	70.8	1652
105	122	76015-110	3	142	99	1.5	1.5	61.3	1614
106	30	76026-007	2	125	54	3	2.5	79.1	1612
107	16	76025-042	2	136	120	2	2.5	73.5	1588
108	145	76013-068	2.5	127	88	3	3	65.6	1571
109	152	76032-040	3	138	56	3	2	67.7	1571
110	27	76026-004	2.5	122	49	3	2.5	78.9	1562
111	146	76013-087	3	146	90	3	2	74	1548
112	94	76015-032	3	125	47	3	3	77.3	1538
113	128	76015-124	2	131	86	2.5	2	76.5	1538
114	81	76015-005	3	138	60	3	3	90	1533
115	11	76025-026	2.5	126	110	2	2	66.1	1493

Table 12. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
116	5	76025-019	3	129	90	2.5	2	67.7	1479
117	88	76015-018	3	150	64	3	2.5	71.1	1476
118	75	76026-072	2	162	132	1	1.5	74.7	1445
119	2	76025-015	2.5	127	54	3	2.5	64.4	1426
120	92	76015-028	2.5	138	78	3	2.5	75.6	1407
121	86	76015-016	3	150	44	3	2.5	74.8	1379
122	118	76015-092	3	146	40	3	1	61.6	1376
123	6	76025-020	3	128	90	3	2	75.5	1357
124	117	76015-090	3	122	76	3	3	73.8	1319
125	109	76015-076	3	153	76	3	2	89.8	1307
126	7	76025-021	3	145	95	2	1.5	68.3	1305
127	135	76013-007	2.5	131	79	3	2	72	1300
128	29	76026-006	2	133	52	3	2	70.7	1295
129	124	76015-116	3	154	58	3	1	64.3	1293
130	63	76026-054	3	138	80	3	2.5	72.3	1276
131	126	76015-119	3	134	29	3	3	73.8	1276
132	4	76025-018	2	132	100	3	2.5	79.3	1267
133	105	76015-066	3	137	49	3	3	72.9	1224
134	1	76025-010	2	126	78	3	2.5	73.9	1219
135	112	76015-082	3	143	90	2.5	2	71.9	1212

Table 12. (Continued)

Rank No.	Entry No.	*1 Pedigree	Seedling Vigor	*2 Days To 50% Bloom	Plant Height cm.	Plant Agron. Rate	Head Agron. Rate	Percent Grain in Heads	Grain Yield kg/ha
136	40	76026-020	2.5	145	108	1.5	2	75.7	1198
137	151	76032-025	2.5	136	89	3	3	73.3	1186
138	121	76015-109	3	138	62	3	2.5	67.5	1157
139	102	76015-059	2.5	136	48	3	2	68.9	1138
140	130	76015-126	3	153	93	3	2	66.4	1133
141	90	76015-023	3	148	58	2.5	2.5	71.9	1126
142	87	76015-017	3	148	72	3	2.5	70.7	1124
143	155	76041-006	3	138	62	3	2	67.7	1086
144	108	76015-073	3	124	72	3	2.5	66.8	1076
145	61	76026-051	3	158	114	1.5	2.5	69.7	1043
146	110	76015-077	3	145	44	3	3	78.2	974
147	136	76013-014	3	136	84	3	3	73.4	955
148	144	76013-055	3	134	70	3	3	60.5	943
149	83	76015-007	3	136	48	3	3	69.2	886
150	82	76015-006	2.5	146	59	3	3	62.4	786
151	103	76015-060	3	146	65	3	2	46.8	779
152	31	76015-060	3	136	61	3	3	70.7	750
153	84	76015-009	3	146	62	3	3	52.7	700
154	20	76025-051	3	137	106	3	3	58.6	560

TEST NO. 77085

Plant Species Demonstration

Test Description, Seed Source and Purpose:

This test consists of 146 single plots in which a number of agronomic crop genotypes were planted. A complete listing is given in Table 13.

The seed came from various sources: Yemen, the United States, and other countries.

The purpose of this demonstration, which was planted along the front edge of the research farm, was to show visitors crops other than sorghum and how they compare when planted at the same time.

Plot Size and Treatment:

The plot sizes varied from one to several rows, .7m apart and six meters long. The plots were irrigated as needed.

Results:

The various sunflower entries grew very well and produced large heads. This plant species looks like it could have potential in this environment.

Most other species performed as expected and were observed by a number of visitors.

Table 13. Name, Description and Date of 50% Bloom of Numerous Cultivated Plants in a Demonstration Planting at Sana'a, 1977. (77085)

Entry No.	*1 Plant	Type of Plant	*2, *3 Date of 50% Bloom
1	Grain Sorghum	Local	12-10
2	" "	"	12-10
3	" "	"	24-8
4	" "	"	24-8
5	" "	Sanaa 4 (Improved)	27-8
6	" "	" 4 "	27-8
7	" "	" 5 "	29-8
8	" "	" 5	29-8
9	" "	" 6 "	25-8
10	" "	" 6 "	25-8
11	" "	DeKalb D42 (Hybrid)	31-8
12	" "	" C42y "	20-9
13	" "	" BR54 "	15-9
14	" "	Northrup King 121 (Hybrid)	14-8
15	" "	" " 129 "	29-8
16	" "	" " 233 "	28-8
17	" "	Taylor-Evans 44C (Hybrid)	31-8
18	" "	" " 66 "	15-9
19	" "	RS 626 (Hybrid)	15-9
20	" "	RS 671 "	20-9
21	" "	NK 233 "	20-9
22	" "	NK 233 "	20-9
23	" "	NK 233 (F_2)	25-9
24	" "	NK 233 (F_2)	25-9
25	" "	NK 233 (F_3)	25-9
26	" "	NK 233 (F_3)	25-9
27	" "	Q10-Bird Resistant	-
28	Millet	Channel	-
29	Grain Sorghum	A CK 60 (Sterile)	-
30	" "	A CK 60 "	-
31	" "	B CK 60 (Non-Restorer)	-
32	" "	B CK 60 (Non-Restorer)	-
33	" "	PR 1 BR (RM POPN)	-
34	" "	PR 1 BR " "	-
35	" "	NP 3R (Dry) (RM POPN)	-
36	" "	NP 3R (Dry) " "	-
37	Forage "	NES 1683	-
38	" "	NES 1683	-
39	Sorghum X Sudan	Sud-Am	-
40	" "	Sud-Am	-

*1 Plot size = 1 row 6 meters long and .7 meters between rows.
*2 Planted dry May 8 and 9 and irrigated on May 9, 1977.
*3 "X" = entire plot lost, either nothing came up or the seedlings died soon after emergence.
"-" = no date of bloom was obtained or recorded.

Table 13. (Continued)

Entry No.	*1 Plant	Type of Plant	*2, *3 Date of 50% Bloom
41	Sudangrass	Wheeler	-
42	Sudangrass	Wheeler	-
43	Millet	Composite (Marana)	28-8
44	"	" "	28-8
45	"	Local	-
46	"	"	-
47	Triticale	#203	29-8
48	"	#203	29-8
49	"	#418	20-8
50	"	#418	20-8
51	"	Rosner	28-8
52	"	Rosner	28-8
53	Sunflower	Hybrid 852	17-7
54	"	" "	18-7
55	"	" 891	1-8
56	"	" 891	1-8
57	"	" 893	2-8
58	"	" 893	2-8
59	"	" 894	28-7
60	"	" 894	28-7
61	"	" 8944	25-7
62	"	" 8944	25-7
63	"	Krasnodarets	18-7
64	"	"	18-7
65	"	Peredovik	24-7
66	"	"	24-7
67	"	Royal Circle 6	25-7
68	"	" " 6	26-7
69	"	" " 7	29-7
70	"	" " 7	29-7
71	"	Sputnik	28-7
72	"	"	28-7
73	Sunflower	Sundak	24-7
74	Cotton	G. barbadense - Pima S4	X
75	"	" " " "	X
76	"	" hirsutum - DPL 16	X
77	"	" " - DPL 16	X
78	"	" " - Super Okra Leaf	-
79	"	" " " " "	X
80	"	6X-Hexaploid - 6X-3-16-17	-
81	"	" " "	-
82	"	" " 6X-50	-
83	"	" " "	-
84	Oats	Chief	20-7

Table 13. (Continued)

Entry No.	*1 Plant	Type of Plant	*2, *3 Date of 50% Bloom
85	Oats	Chief	20-7
86	"	O'Brien	10-7
87	"	"	10-7
88	"	Coker 234	12-7
89	"	" "	12-7
90	"	Coronado	15-7
91	"	"	15-7
92	"	Cortez	19-7
93	"	"	19-7
94	"	New Nortex	26-7
95	"	"	26-7
96	"	Nora	24-7
97	"	Nora	24-7
98	Barley	Six Row	12-8
99	"	"	12-8
100	"	Drought Composite	15-8
101	"	" "	15-8
102	"	Short Composite	10-8
103	"	" "	10-8
104	Wheat	Webster X Minn II-62-16-9-1	25-8
105	"	" "	25-8
106	"	" II-62-16-10-1	18-7
107	"	" "	18-7
108	"	" II-62-16-12-1	23-8
109	"	" "	23-8
110	"	" II-62-16-13-2	28-8
111	"	" "	28-8
112	"	" II-62-16-17-1	20-8
113	"	" "	20-8
114	"	" II-62-16-19-1	18-8
115	"	" "	18-8
116	"	" II-62-16-23-1	24-8
117	"	" "	24-8
118	"	" II-62-16-25-1	20-8
119	"	" "	20-8
120	"	" II-62-16-29-1	10-8
121	"	" "	10-8
122	"	" II-62-16-32-1	15-8
123	"	" "	15-8
124	"	" II-62-16-34-1	23-8
125	"	" "	23-8
126	"	" II-62-16-35-1	24-8
127	"	" "	24-8
128	"	" II-62-16-38-1	25-8
129	"	" "	25-8
130	"	Oro (Winter)	1-8
131	"	" "	X
132	Safflower	Gila	30-7

Table 13. (Continued)

Entry No.	*1 Plant	Type of Plant	*2, *3 Date of 50% Bloom
133	Safflower	Gila	30-7
134	"	Oleic Leed	2-8
135	"	" "	2-8
136	"	UC-1	30-7
137	"	"	30-7
138	Corn	Sweet	28-8
139	"	"	28-8
140	"	"	28-8
141	"	"	28-8
142	"	Field	20-8
143	"	"	20-8
144	"	"	20-8
145	"	"	X
146	Grain Sorghum	Local	-

TEST NO. 77086

Date-of-Planting Test for Sorghum and for Pearl Millet

- Sorghum -

Test Description and Purpose:

This test consisted of two sorghum genotypes planted about every two weeks for a total of six plantings. The purpose was to observe any changes in agronomic characteristics with periodic dates-of-planting. All data are presented in Table 14.

Plot Size and Treatment:

The plot size was 4 rows 6m long spaced .7m apart in 4 replications. Irrigation water was supplied as needed.

Results:

The days to 50% bloom stayed the same for all plantings except the last planting which never bloomed.

The plant heights decreased with each later date of planting. Thus later plantings tie up the land just as long but give less forage production.

The stands were too poor to obtain grain yields.

- Millet -

Test Description and Purpose:

This test consisted of two pearl millet genotypes planted about every two weeks for a total of six plantings. The purpose was to observe any changes in agronomic characteristics with periodic dates of planting. All data are presented in Table 15.

Plot Size and Treatment:

The plot size was four rows six meters long spaced .7 meter apart in four replications. Irrigation water was supplied as needed.

Results:

The days to 50% bloom stayed about the same for all plantings.

The plant heights decreased with each later date of planting.

In conclusion it can be said that most millet plantings will tie up the land just as long irregardless of the date planted. There will be less forage with later dates of planting from the shorter heights.

There were no grain yields because of such poor stands.

Table 14. Some Agronomic Data From Six Dates Of Planting Of Two Sorghum Genotypes At Sana'a, Yemen. 1977. Test 77086.

*1 Date Of Planting In Moisture	Pedigree	Days To 50% Bloom	Plant Height cm.
05 May 1977	Local	118	130
	Sana'a 6	126	124
18 May 1977	Local	112	116
	Sana'a 6	115	122
01 June 1977	Local	106	114
	Sana'a 6	112	94
15 June 1977	Local	108	101
	Sana'a 6	117	81
29 June 1977	Local	118	75
	Sana'a 6	125	70
13 July 1977	Local	-	42
	Sana'a 6	-	48

*1 Plot Size = 4 rows 6 m long spaced .7 m apart with four replications.

Table 15. Some Agronomic Data From Six Dates Of Planting Of Two Pearl Millet Genotypes At Sana'a, Yemen. 1977. Test 77086.

*1 Date Of Planting In Moisture	Pedigree	Days To 50% Bloom	Plant Height cm.
05 May 1977	Local	126	144
	Early Millet	106	128
18 May 1977	Local	118	132
	Early Millet	115	134
01 June 1977	Local	122	113
	Early Millet	109	94
15 June 1977	Local	125	96
	Early Millet	117	76
29 June 1977	Local	125	85
	Early Millet	113	75
13 July 1977	Local	125	60
	Early Millet	125	72

*1 Plot Size = 4 rows 6 m long spaced .7 m apart with four replications.

TEST NO. 77087

Pearl Millet Adaptation Trial

Test Description, Seed Source, and Purpose:

There were twenty pearl millet genotypes in this test and two local genotypes. The seed was supplied by ICRISAT in their "Second International Pearl Millet Adaptation Trial - 1976". The seed was received too late to plant in 1976 so it was saved for planting in 1977.

The purpose was to evaluate these 20 genotypes for general yield and adaptation. This same test was sent to many other countries in order to evaluate the entries adaptation to many different environments. A list of all entries are given in Table 16.

Plot Size and Treatment:

The plot size was one row six meters long with rows spaced .7m apart in three replications.

Results:

This test was planted in field E in an area to which irrigation facilities proved to be inadequate. The test was planted dry on May 15, 1977. A rain on May 22 and 23 germinated most of the seed but was inadequate to sustain growth. The seedlings dried up and died.

A farmer would normally not plant dry like we did. He would wait for good subsoil moisture or not plant. We counted on the irrigation system being developed and used to replace rain but this didn't work out.

The test was abandoned.

Table 16. List of Twenty Two Entries from the Second International Pearl Millet Adaptation Trial (1976) at Sana'a, 1977. Test No. 77087.

Entry No.	*1 Entry	Entry No.	*1 Entry
1	Synthetic 7601	12	SC 13-HX75
2	Synthetic 7602	13	WC-CX75
3	Synthetic 7603	14	MC-SX75
4	ICI 766	15	LC-SC75
5	ICH 108	16	NC-SX75
6	ICH 105	17	KM-1
7	ICH 107	18	PHB-14
8	ICH 13	19	KM-2
9	EX. BOYNU	20	PSB-3
10	MC-CO	21	LOCAL
11	ICI 7540	22	LOCAL

*1 This test was planted dry on May 15, 1977 but could not be irrigated up due to inadequate irrigation equipment. A small rain on May 22 and 23 sprouted much of the seed which then died from severe drought. This test was abandoned completely and no data collected. It had been planted in plots of 1 row (rows .7m apart) x 6m long in 3 replications.

TEST NO. 77088

Sorghum and Millet Nursery

Test Description and Purpose:

This test consisted of several hundred different sorghum and millet genotypes. Most were standard varieties or lines from sorghum breeding projects in the United States. The purpose of this planting was to evaluate and select those genotypes that might show potential for Yemen. These entries are listed in Table 17.

Plot Size and Treatment:

The single row plot size was one row 6 meters long with .7 meter between rows. Many entries in this nursery were entered in several plot rows. Table 17 presents the number of individual rows per plot of a genotype. This nursery was supplied with water and care as needed for optimum growth as best our resources permitted.

Results:

Basic plant data on seedling vigor, days to 50% bloom, height, and plant agronomic phenotype were taken on most plots and are presented in Table 17. Many of the United States types of sorghums are not very well adapted per se. The day length and temperature at Sana'a produces a very short plant (40 to 60 cm) with a long maturity of 120 to 140 days to bloom. These types are not desirable for the Yemen farmer because of the low forage production.

Plants of the better lines were selfed for seed for the project germplasm breeding collection, some crosses were made on genetic steriles and A and B lines of genetic steriles were propagated.

Of particular interest was the apparent frost tolerance of some NES lines (between plots 313 thru 335) which survived a frost which killed the rest of the research farm plots.

Table 17. Entry List with Some Agronomic Data from the Sorghum and Millet Nursery at Sana'a, 1977. Test No. 77088.

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
101	76016-002 X Local F_1	1	-	110	1	
102	76016-008 X Local F_1	-	-	-	-	
103	CK 60 A	3	128	60	2	
104	" A	2	128	65	2	
105	" A	2	128	55	2	
106	" A	2	128	60	2	
107	" A	2	128	58	2	
108	" A	3	128	60	2	
109	" A	3	128	60	2	
110	" A	3	128	60	2	
111	" A	3	128	70	2	
112	" A	3	128	66	2	
113	" A	3	128	66	2	
114	" A	3	128	70	2	
115	" A	2	128	60	2	
116	" A	2	128	50	2	
117	" A	2	128	50	2	
118	" A	2	128	50	2	
119	" A	2	128	60	2	
120	" A	3	128	60	2	
121	" B	3	128	50	2	
122	" B	3	128	50	2	
123	Martin B	3	130	40	2	
124	" B	3	130	40	2	
125	" A	3	130	40	2	
126	KS 24 A	-	-	-	1	
127	" A	-	-	-	1	
128	" B	-	-	-	1	
129	I 2219 A	3	-	40	2	
130	" A	2	-	40	2	
131	" B	2	-	40	2	
132	I 3659 A	2	-	40	2	
133	" A	3	-	40	2	
134	" B	3	-	35	2	
135	I 10244 A	3	130	35	2	
136	" A	3	130	40	2	
137	" B	3	130	40	2	
138	I 10254 A	3	113	40	2	
139	" A	2	112	40	2	
140	" B	2	111	50	2	

*1 Plot size: 1 row (.7m between rows) X 6m.
*2 Seedling vigor scores: 1=good, 2=average, 3=poor.
*3 Planted dry on May 4 and irrigated on May 5, 1977.
*4 Height from ground level to the top of the head of an average plant.
*5 Mature plant scores: 1=good, 2=average, 3=poor.
*6 Frost tolerant.

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
141	I 10446 A	1	133	50	1	
142	" A	1	133	60	1	
143	B	1	133	50	1	
144	10576 A	2	-	40	2	
145	" A	-	-	-	-	
146	" B	3	-	40	2	
147	I 10620 A	2	128	70	1	
148	" A	2	128	70	1	
149	" B	2	128	70	1	
150	I 10690 A	2	-	90	1	
151	" A	1	-	90	1	
152	" B	1	-	95	1	
153	I 10694 A	2	-	75	1	
154	" A	2	-	70	1	
155	" B	2	-	70	1	
156	Maldani A	1	-	120	1	
157	" A	1	-	130	1	
158	" B	2	-	110	1	
159	Martin MS, SIB (50106037)	1	128	50	2	
160	"	2	128	50	2	
161	Stewart Sorgh. Hds. I	2	126	70	1	
162	" I	1	126	70	1	
163	" II	1	126	80	1	
164	CK 60 A	2	128	70	2	
165	" A	2	128	70	2	
166	PR 1 BR	2	126	80	3	
167	"	3	126	90	3	
168	Snowflake '76 Fertile	3	Range	50	2	
169	"	3	of 83	60	2	
170	" Sterile	3	to 123	60	2	
171	" "	3	Mean	50	2	
172	" "	2	= 112	50	2	
173	" "	2	"	60	2	
174	" "	2	"	60	2	
175	" "	3	"	60	2	
176	" "	2	"	60	2	
177	" "	3	"	55	2	
178	" "	3	"	55	2	
179	" "	2	"	60	2	
180	Yuma Root Rot Resist. RM Popn.	2	133	60	2	
181	"	3	133	70	2	
182	Safford Salt Tol. RM Popn.	2	136	80	2	
183	"	2	136	50	2	
184	NP3R Irrigated RM Popn.	2	120	60	2	
185	"	3	120	50	2	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
186	NP3R Drought RM Popn.	3	128	50	2	
187	"	3	128	50	2	
188	NP9BR Drought RM Popn.	3	132	75	2	
189	CIMMYT '75-C-61	3	103	75	3	
190	-62	2	105	50	3	
191	-63	2	103	60	3	
192	-64	3	106	50	2	
193	-65	3	119	60	3	
194	-66	2	123	40	3	
195	-67	2	107	50	3	
196	-68	3	123	60	2	
197	-69	3	119	55	3	
198	-70	3	128	80	3	
199	-71	3	118	55	3	
200	-72	3	123	60	3	
201	-73	2	111	50	3	
202	-74	3	112	50	3	
203	-75	2	123	60	3	
204	-76	2	125	50	3	
205	-77	2	122	70	3	
206	-78	2	126	50	3	
207	-79	2	123	60	3	
208	-81	1	112	70	2	
209	-82	2	111	70	3	
210	-83	2	110	70	2	
211	-84	2	107	50	3	
212	-85	3	109	70	3	
213	-87	2	99	70	3	
214	-88	2	100	70	3	
215	-89	2	103	60	3	
216	-90	2	101	55	3	
217	-91	1	106	80	3	
218	-92	2	102	50	3	
219	-93	1	99	50	3	
220	-94	2	102	50	3	
221	-95	2	110	60	3	
222	-96	2	119	75	2	
223	-97	1	89	60	3	
224	-98	2	92	60	3	
225	-99	2	93	70	3	
226	-100	1	88	70	3	
227	-101	2	105	80	3	
228	-102	1	104	60	3	
229	-103	2	106	40	3	
230	-104	2	101	40	3	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
231	CIMMYT '75-C-105	2	103	70	3	
232	-106	2	109	60	3	
233	-107	2	101	50	3	
234	-108	1	97	70	3	
235	-109	2	97	50	3	
236	CIMMYT '75 C-110	2	99	50	2	
237	-111	1	88	60	3	
238	-112	2	89	70	3	
239	-113	3	92	70	3	
240	-114	2	97	70	3	
241	-115	2	92	60	3	
242	-116	2	99	50	3	
243	-117	2	106	50	3	
244	-118	2	97	70	3	
245	-119	1	88	70	3	
246	-120	2	92	60	3	
247	-121	2	92	70	3	
248	-122	3	92	70	3	
249	-123	3	99	70	3	
250	-124	3	107	40	3	
251	-125	2	103	70	2	
252	-126	3	97	60	2	
253	-127	3	123	40	3	
254	-128	3	128	60	2	
255	-129	3	111	60	3	
256	-130	3	126	60	3	
257	-131	3	112	50	3	
258	Local Check	-	-	-	-	
259	CIMMYT '75-C-132	3	102	60	3	
260	-133	3	107	60	3	
261	-134	3	107	50	3	
262	-135	3	105	80	3	
263	-136	3	118	70	3	
264	-137	3	133	80	2	
265	-138	2	117	70	3	
266	-139	3	107	70	3	
267	-140	2	102	80	3	
268	-141	3	128	70	2	
269	-142	1	99	60	3	
270	-143	2	113	50	3	
271	-144	3	106	70	3	
272	CIMMYT '76-BJ 197	3	106	40	1	
273	-BJ 138	2	102	50	3	
274	-BJ 105	2	112	60	3	
275	-BJ 94	2	99	60	3	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
276	CIMMYT '76-74LH3270	3	111	45	3	
277	-BJ 28	3	99	50	2	
278	-BJ 340	3	110	40	3	
279	-BJ 12	3	111	70	2	
280	-BJ 188	3	115	40	2	
281	-BJ 39	3	127	40	3	
282	-74LH3247	3	109	60	3	
283	-BJ 128	3	130	50	2	
284	-74B04	3	126	60	3	
285	-BJ 195	2	127	50	3	
286	-75B100	2	129	55	3	
287	-BJ310	2	111	40	3	
288	-BJ 168	3	113	60	3	
289	-72B18	2	119	40	3	
290	-BJ 19	3	109	40	3	
291	-FS 7315-4019	2	116	55	3	
292	-BJ 402	3	124	50	2	
293	-BJ 34	3	119	50	2	
294	-BJ 401	2	109	40	3	
295	-FS 7315-4020	3	111	50	3	
296	-BJ 3133	2	102	70	3	
297	-BJ 107	2	111	80	3	
298	-74B41	3	120	60	1	
299	-74LH3213	3	127	70	3	
300	-BJ 238	3	102	70	3	
301	-BJ 268	2	116	60	3	
302	N-9040	2	136	60	2	
303	N-6250	2	137	70	2	
304	168	3	133	70	1	
305	CS-3541	-	-	-	-	
306	Tigre Big Seed	-	-	-	-	
307	TX 7000	2	130	75	2	
308	TX 2536	-	-	-	-	
309	TX 7078	3	130	60	2	
310	TX 04	-	-	-	-	
311	TX 7005	-	-	-	-	
312	Redbine 60	-	130	50	2	
313	NES 6970	2	126	110	1	*6
314	NES 6971	2	123	90	1	*6
315	NES 6972	1	-	130	1	*6
316	NES 6973	1	129	150	1	*6
317	NES 6974	2	127	130	1	*6
318	NES 6975	1	116	140	1	*6
319	NES 6976	1	115	130	1	
320	NES 6977	1	-	-	1	*6

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
321	NES 6978	1	-	210	1	*6
322	NES 6979	1	112	150	1	
323	NES 6980	1	-	190	1	*6
324	NES 6981	1	116	140	1	
325	NES 6982	1	126	220	1	*6
326	NES 6983	1	126	160	1	*6
327	NES 6984	1	127	180	1	
328	NES 6985	1	111	140	1	
329	NES 6986	1	111	170	1	*6
330	NES 110	2	134	80	2	*6
331	NES 1500	3	136	100	2	*6
332	NES 2141	-	-	-	3	*6
333	NES 3329	2	137	100	2	*6
334	IS 509	3	136	110	2	*6
335	IS 2197	3	133	90	2	*6
336	IS 9958	-	-	-	-	
337	7078	3	130	50	2	
338	Bishop-FC 8993	3	140	80	1	
339	Blue Maize	3	133	50	2	
340	Bonita-SA 79	3	128	70	3	
341	Bonita 20	3	134	60	3	
342	Chiltex	3	-	70	2	
343	Club X Day LA 38-2	3	133	40	3	
344	Resist. Colby	3	128	40	3	
345	Susc. Colby-SA 300	2	-	30	3	
346	Club Day	2	-	40	3	
347	Custer	3	-	50	2	
348	Darso-Tall	2	-	80	2	
349	Darso-Short	2	-	70	2	
350	Darso 28	2	-	70	2	
351	Darset	3	139	40	3	
352	Dalhart	2	136	40	3	
353	Durra-SA 217		126	80	2	
354	Durra-CI950	2	137	60	2	
355	Durra-CI951	2	133	40	3	
356	Durra-CI953	2	136	130	1	
357	Dwarf White Durra HS 412	2	132	70	2	
358	Durra-FP1 55128	2	128	70	3	
359	Feterita-CI 182	3	139	50	3	
360	Feterita-FC 811	3	139	60	3	
361	Combine White Feterita SA 6649-34	3	140	50	3	
362	Combine White Feterita TX09	3	-	35	3	
363	Dwarf Feterita	3	134	40	3	
364	Feterita Fayoumi	2	134	50	3	
365	Spur Feterita	2	137	40	2	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
366	Dwarf White Hegari	3	138	40	3	
367	Hegari "20"	3	142	40	3	
368	Combine Hegari-SA 392	3	146	40	3	
369	Double Dwarf Hegari	3	147	40	3	
370	Regular Hegari	3	143	50	3	
371	Early Hegari -TS 2524B-AS580	-	-	-	3	
372	Hegari Swift	-	-	-	3	
373	Big Seeded Indian	-	-	-	3	
374	Combine Kafir 60-SA 3197	2	140	60	2	
375	CK 60B	2	140	40	2	
376	CK 60 MS (Normal)	2	133	60	2	
377	Hydro Kafir	2	139	80	1	
378	Sedan Kafir-CI-1103	3	147	70	3	
379	Pink Kafir-AS 522	2	126	70	2	
380	Red Kafir-AS 238	3	141	60	2	
381	Sugary Kafir	3	142	70	2	
382	Tall Combine Kafir 60	3	139	75	2	
383	Texas Black Hull Kafir	2	133	70	1	
384	Tall Black Kafir-AS 194	3	140	110	1	
385	KS 30 (Greenbug Resist)	3	128	60	3	
386	KS 41 "	2	133	60	2	
387	KS 42 "	3	137	70	2	
388	KS 43 "	3	135	70	2	
389	KS 44 "	2	137	50	2	
390	KS 55 "	3	140	40	2	
391	Maizola	2	133	40	2	
392	Mancillo-AS 341	3	142	60	3	
393	Martin	3	133	50	3	
394	MP 10	3	128	40	3	
395	MP 10 Shallu	3	131	66	3	
396	Chinch Bug Resistant Milo	3	133	70	3	
397	CBR Milo	3	131	50	2	
398	Double Dwarf Sooner	2	146	30	2	
399	Double Dwarf 3[illegible] AS 586	-	-	-	-	
400	Double Dwarf Yellow Milo Calif. 38	2	133	300	2	
401	Double Dwarf Yellow Sooner Milo	2	116	30	2	
402	90 Day Milo	2	112	40	2	
403	Finney Milo (FC 161219)	2	107	50	2	
404	Edwards Milo	3	127	60	2	
405	4 Dwarf Milo Red	2	111	30	2	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
406	Sooner SA 5043	2	105	50	2	
407	Standard White Milo (C1352)	2	111	50	3	
408	SM 100 Milo	2	128	40	2	
409	Meloland	3	129	60	2	
410	New Mexico 31 (Weskan X Redbine 60)	3	130	40	2	
411	Norghum	-	130	-	3	
412	Norkan	2	119	80	2	
413	Plainsman	3	126	50	2	
414	Rancher	3	111	80	3	
415	RRR Quadroon	3	139	80	2	
416	Redbine 58	3	138	50	2	
417	Redbine 60	3	115	50	2	
418	Redbine 66	3	128	40	2	
419	Redlan	3	127	70	2	
420	Reliance	-	-	-	-	
421	SA 7005	2	129	50	2	
422	Sagrain (Bird Tol)	2	133	50	2	
423	SD 100	3	111	30	2	
424	SD 102	3	112	40	2	
425	SD 106	2	109	40	2	
426	Double Dwarf Shrock	3	139	70	1	
427	Westland	2	136	40	2	
428	Wheatland	2	-	40	2	
429	Wheatland (Resistant)	2	-	40	2	
430	Wheatland (Dalhart)	3	133	30	2	
431	WGF	3	111	30	3	
432	P.I. 166967	3	130	60	3	
433	P.I. 170777	3	111	70	3	
434	P.I. 170797	3	112	80	3	
435	P.I. 183423	3	-	70	3	
436	P.I. 192979	3	-	40	3	
437	P.I. 192880	2	-	70	2	
438	P.I. 221725	2	-	40	3	
439	P.I. 236289	2	-	50	3	
440	Hegari X Yellow Endosperm Short and Early	-	-	-	-	
441	Pink Kafir X Redbine 60	2	117	40	2	
442	Shrock Ellis X Bishop	1	140	70	2	
443	Sweet Sterile Redlan Thurman A X B X C26	2	128	50	2	
444	Westland X Bishop	2	-	50	2	
445	Wisconsin 238	2	-	70	2	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
446	TX04	3	115	50	2	
447	TX07	3	123	40	2	
448	TX74	3	140	60	2	
449	TX411	3	-	60	3	
450	TX412	3	-	30	3	
451	TX414	3	-	30	3	
452	TX415	3	-	30	3	
453	TX416	3	-	40	3	
454	TX421	3	-	30	3	
455	TX2508	3	-	30	3	
456	TX2518	3	-	50	2	
457	TX2521	3	-	50	3	
458	WC916	3	-	60	3	
459	WC1069	3	111	50	3	
460	WC1817	3	112	40	3	
461	WC1817 (Short)	3	115	40	3	
462	WC1817 (Tall)	3	115	70	3	
463	WC2023	3	137	70	2	
464	WC2060	3	-	40	3	
465	SA10302	2	-	50	3	
466	SA7536-1(Greenbug Resist)	2	-	40	3	
467	Pop Sorghum	3	128	50	3	
468	Pop Sorghum (Dwarf)	-	-	-	3	
469	Acme Dwarf Broomcorn	3	-	90	2	
470	Broomcorn (New Mexico)	1	-	00	2	
471	Calf. Golden Broomcorn	2	139	20	2	
472	Plains #1 Broomcorn	1	-	00	1	
473	Shatter Cane #3	2	-	90	3	
474	Shatter Cane #5	2	128	80	3	
475	Shatter Cane #6	2	123	90	3	
476	Shatter Cane #14	2	139	90	2	
477	SA2309	3	-	60	2	
478	65 LH14 (Tall)	3	-	40	3	
479	65 LH14 (Short)	3	-	30	3	
480	Ajax	3	-	50	2	
481	Arkansas Leafy 41	3	133	80	2	
482	Arkansas Leafy 44	3	140	60	1	
483	Arkansas Leafy 46	2	-	50	1	
484	Atlas	-	-	-	-	
485	Cassagi Istrahne	2	-	5	3	
486	Collier	2	134	80	2	
487	Corneus Sorghum	-	-	-	2	
488	Dale	2	-	100	2	
489	Dual	-	-	-	3	
490	Bowar Durra	2	-	70	2	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
491	Gooseneck	-	-	-	3	
492	Honey	-	-	-	2	
493	TR. Kaoliang	2	-	130	2	
494	Lemon Yellow	-	-	100	2	
495	Leoti	2	123	100	2	
496	Leoti Red	3	124	100	2	
497	Malong	3	-	40	3	
498	Manko	-	-	-	-	
499	Minnesota Amber	3	112	100	3	
500	Kansas Orange	2	-	100	2	
501	Sourless Orange	3	-	80	2	
502	Red Top Cane	3	-	110	2	
503	Red Amber	2	123	106	3	
504	Rox	2	123	90	2	
505	Schrock	3	-	90	2	
506	Honey Sorbo	3	-	90	2	
507	Sourless	3	-	60	3	
508	Sumac	3	123	105	2	
509	Sumac Cane	3	123	80	2	
510	Early Sumac	3	123	110	2	
511	Med. Dwarf Sumac (FC35446)	3	123	70	2	
512	Sart	3	133	75	3	
513	Tracy	-	-	-	2	
514	P.I. 195755	2	140	170	1	
515	P.I. 195759	2	140	160	1	
516	I923-Bulk YX 148	2	-	70	-	
517	"	2	-	90	-	
518	"	2	-	85	-	
519	"	2	-	70	-	
520	"	2	-	60	-	
521	I948 Bulk YX Swarna	2	-	70	-	
522	"	2	-	60	-	
523	"	3	-	60	-	
524	"	3	-	70	-	
525	"	3	-	70	-	
526	I968 Bulk YX 2219B	3	-	60	-	
527	"	3	-	70	-	
528	"	3	-	80	-	
529	"	2	-	50	-	
530	"	2	-	50	-	
531	I972 Bulk YX C53541	2	-	60	-	
532	"	-	-	60	-	
533	"	2	-	40	-	
534	"	2	-	50	-	
535	"	2	-	50	-	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
536	I989 Bulk YX 269	2	-	60	-	
537	"	-	-	40	-	
538	"	2	-	40	-	
539	"	3	-	60	-	
540	"	3	-	50	-	
541	I994 Bulk YX 329	2	-	50	-	
542	"	2	-	60	-	
543	"	2	-	70	-	
544	"	2	-	70	-	
545	"	2	-	60	-	
546	I1013 Bulk YX R16	2	-	50	-	
547	"	2	-	80	-	
548	"	2	-	80	-	
549	"	3	-	70	-	
550	"	3	-	70	-	
551	I1048 Bulk YX H109	2	-	65	-	
552	"	2	-	80	-	
553	"	3	-	70	-	
554	"	3	-	80	-	
555	"	3	-	70	-	
556	I1061 Bulk YX NJ 1944	3	-	70	-	
557	"	3	-	70	-	
558	"	3	-	40	-	
559	"	3	-	80	-	
560	"	3	-	60	-	
561	I1098 Bulk YX IS 3691	3	-	60	-	
562	"	3	-	40	-	
563	"	3	-	40	-	
564	"	3	-	50	-	
565	"	3	-	30	-	
566	I1115 WABC X 148	3	-	60	-	
567	"	3	-	80	-	
568	"	3	-	60	-	
569	"	3	-	80	-	
570	"	3	-	80	-	
571	I1134 WABC X CS 3541	3	-	60	-	
572	"	3	-	40	-	
573	"	3	-	50	-	
574	"	2	-	50	-	
575	"	3	-	50	-	
576	I1145 WABC X 269	3	-	50	-	
577	"	3	-	70	-	
578	"	-	-	60	-	
579	"	3	-	70	-	
580	"	3	-	70	-	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
581	I1159 WABC X S302	3	-	60	-	
582	"	3	-	60	-	
583	"	3	-	60	-	
584	"	3	-	70	-	
585	"	2	-	60	-	
586	I1171 WABC X R16	2	-	50	-	
587	"	3	-	50	-	
588	"	2	-	60	-	
589	"	3	-	100	-	
590	"	2	-	70	-	
591	I1196 WABC X NJ 1944	2	-	70	-	
592	"	2	-	50	-	
593	"	3	-	80	-	
594	"	3	-	90	-	
595	"	3	-	80	-	
596	I1209 WABC X 168	3	-	70	-	
597	"	3	-	60	-	
598	"	3	-	60	-	
599	"	3	-	70	-	
600	"	3	-	90	-	
601	I1215 WABC X 329	2	-	80	-	
602	"	2	-	60	-	
603	"	2	-	70	-	
604	"	2	-	60	-	
605	"	2	-	70	-	
606	I1223 WABC X H 109	1	-	60	-	
607	"	2	-	50	-	
608	"	2	-	60	-	
609	"	2	-	50	-	
610	"	3	-	60	-	
611	I1227 WABC X IS 3691	2	-	40	-	
612	"	2	-	40	-	
613	"	3	-	50	-	
614	"	3	-	40	-	
615	"	3	-	60	-	
616	I1439(CS3541 X 370 C2219B X PHYR)	3	-	60	-	
617	"	3	-	50	-	
618	"	3	-	40	-	
619	"	3	-	60	-	
620	"	2	-	50	-	
621	I1440 (148 X CS 3541 IS 3691 X 2219B)	3	-	50	-	
622	"	3	-	60	-	
623	"	2	-	50	-	
624	"	3	-	80	-	
625	"	2	-	70	-	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht in cm	*5 Plant Agron. Rating	*6
626	I1441 (C2219B X PHYR 370 X 148)	2	-	60	-	
627	"	2	-	60	-	
628	"	3	-	50	-	
629	"	2	-	60	-	
630	"	3	-	70	-	
631	I1442 (2219B X PHYR) XEN	3	-	50	-	
632	"	3	-	60	-	
633	"	3	-	40	-	
634	"	2	-	50	-	
635	"	3	-	70	-	
636	I1443 (2219BX 148 CS3541 X PHYR)	3	-	70	-	
637	"	3	-	70	-	
638	"	3	-	80	-	
639	"	3	-	70	-	
640	"	3	-	60	-	
641	I1444 (2219BX148 CS3691 X PHYR)	3	-	80	-	
642	"	3	-	30	-	
643	"	3	-	60	-	
644	"	3	-	70	-	
645	"	3	-	60	-	
646	I1445 (R16XCK60B 148 X PHYR)	3	-	70	-	
647	"	3	-	60	-	
648	"	3	-	70	-	
649	"	3	-	80	-	
650	"	3	-	90	-	
651	I1447 (R16 X CK 60B IS3691 X 370)	3	-	70	-	
652	"	3	-	60	-	
653	"	3	-	60	-	
654	"	3	-	60	-	
655	"	3	-	50	-	
656	I1448 (R16XCK60B IS3691X148)	3	-	80	-	
657	"	3	-	60	-	
658	"	3	-	90	-	
659	"	3	-	70	-	
660	"	3	-	70	-	
661	I1449 (R16X PHYR) XEN	2	-	40	-	
662	"	2	-	60	-	
663	"	2	-	60	-	
664	"	3	-	50	-	
665	"	2	-	50	-	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
666	I1450 (370XCK60B 2KX X PHYR)	3	-	70	-	
667	"	3	-	60	-	
668	"	3	-	60	-	
669	"	3	-	50	-	
670	"	3	-	80	-	
671	I1453 (320 X 148 CK60B X E22)	3	-	70	-	
672	"	3	-	80	-	
673	"	3	-	60	-	
674	"	2	-	80	-	
675	"	2	-	90	-	
676	I1456 (CS3541 X CK60B 370 X 148)	3	-	60	-	
677	"	3	-	60	-	
678	"	3	-	80	-	
679	"	3	-	80	-	
680	"	3	-	80	-	
681	I1457 (CS3541XCK60B)XEN	3	-	70	-	
682	"	3	-	80	-	
683	"	3	-	90	-	
684	"	3	-	80	-	
685	"	3	-	80	-	
686	I1458(IS369XPHYR)XEN	3	-	90	-	
687	"	3	-	70	-	
688	"	3	-	60	-	
689	"	3	-	70	-	
690	"	3	-	60	-	
691	I1459(IS3691X148)XEN	3	-	55	-	
692	"	3	-	60	-	
693	"	3	-	60	-	
694	"	2	-	60	-	
695	"	2	-	70	-	
696	I1460(IS3691X2219B)XEN	2	-	40	-	
697	"	2	-	50	-	
698	"	3	-	70	-	
699	"	3	-	40	-	
700	"	3	-	60	-	
701	I1461(CK60B X 370 IS3691 X PHYR)	2	-	60	-	
702	"	1	-	70	-	
703	"	2	-	70	-	
704	"	2	-	70	-	
705	"	2	-	70	-	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
706	I1463(TK60B X 370 IS3691 X PHYR)	3	-	70	-	
707	"	3	-	70	-	
708	"	3	-	50	-	
709	"	3	-	90		
710	"	3	-	60	-	
711	Triticale #203	3	-	-	-	
712	"	3	-	-	-	
713	"	3	-	-	-	
714	"	3	-	-	-	
715	"	3	-	-	-	
716	Triticale #418	3	-	-	-	
717	"	3	-	-	-	
718	"	3	-	-	-	
719	Triticale "Rosner"	3	-	-	-	
720	"	3	-	-	-	
721	"	3	-	-	-	
722	"	3	-	-	-	
723	Abarr (Proso Millet)	1	-	-	-	
724	Butte (Millet)	3	-	-	-	
725	Golden (Fox Tail German Millet)	3	-	-	-	
726	Leonerd (Proso Millet)	1	71	-	-	
727	Minco-Colo "	1	53	-	-	
728	Minco-Minn "	1	54	-	-	
729	Snobird (Proso Millet)	1	53	-	-	
730	White Wonder (Millet)	2	102	-	-	
731	Pearl Millet-Red Bird Resist	2	-	-	-	
732	Mixture Millet Inbreeds 238-239-240	-	-	-	-	
733	A8301 Setnac Millet	-	-	-	-	
734	Starr (Pearl Millet)	-	-	-	-	
735	Marana Composit (Pearl Millet)KS	-	-	-	-	
736	Egyptian Pearl Millet-1	3	-	-	-	
737	" -2	3	-	-	-	
738	" -3	3	-	-	-	
739	" -4	-	-	-	-	
740	" -5	-				
741	" -6	3	-	-	-	
742	Starr Millet	-	-	-	-	
743	Early African Millet	2	-	-	-	
744	Stiff Stalked F3-1	-	-	-	-	
745	" F3-2	2	-	-	-	

Table 17. (Continued)

*1 Plot No.	Entry or Pedigree	*2 Seedling Vigor Score	*3 Days to 50% Bloom	*4 Ht. in cm	*5 Plant Agron. Rating	*6
746	Stiff Stalked F3-3	1	-	-	-	
747	NEP 67	1	107	-	-	
748	NEP 67	2	107	-	-	
749	NEP 104	2	112	-	-	
750	NEP 104	2	112	-	-	
751	NEP 218	2	111	-	-	
752	NEP 218	1	111	-	-	
753	Local	1	110	-	-	
754	Local	1	110	-	-	
755	Ex. Bornu	3	-	-	-	
756	Ex. Bornu	2	-	-	-	
757	Serere	3	-	-	-	
758	Serere	3	-	-	-	
759	Alad Early	1	107	-	-	
760	Alad Early	1	107	-	-	
761	Tr. Millet	2	-	-	-	
762	Tr. Millet	2	-	-	-	
763	Wheeler Sudan	3	117	-	-	
764	Wheeler Sudan	3	117	-	-	

TEST NO. 77089

International Sorghum Cooperative Experimental
Variety Trial #1 (1976), ICRISAT

Test Description, Seed Source and Purpose:

This test contained 33 experimental sorghum genotypes and one local check. The seed was sent from ICRISAT in 1976 but arrived too late to be planted in 1976. The purpose was to evaluate the experimental genotypes for grain yield and general agronomic adaptation. This same test was sent to many other locations around the world to obtain data on the general adaptation of the genotypes involved.

A list of the entries and pedigrees are given in Table 18.

Plot Size and Treatment:

The plot size used for this test was one row, six meters long and .7 meter between rows in two replications. It would have been advisable to have had larger plots but there was insufficient land area on the research farm for larger plots.

This test was to have minimum irrigation in order to simulate droughty rain fed conditions.

Results:

This test was planted dry on May 15, 1977 in field E. It received a rain on May 22 and 23 which sprouted much of the seed which emerged and later died from drought. The irrigation facilities were inadequate to reach this test as planned.

The test was abandoned.

Table 18. List of Thirty Four Entries of the International Sorghum Cooperative Nursery from ICRISAT, Experimental Variety Trial #1 (1976) planted at Sana'a, 1977. Test No. 77089.

Entry No.	*1 ICRISAT No.	Pedigree
1	E 27001	EN 3355
2	A 1867	Fast Lane R (C2)
3	A 1861	Fast Lane R (C2)
4	A 1887	Fast Lane B (C2)
5	A 1863	Fast Lane R (C2)
6	A 1356	EC 64619
7	E 27050	Indian X Exotic 8465
8	E 27041	Diallel 848
9	E 2703	" 858
10	E 27057	" 910
11	E 27079	" 1008
12	E 27045	" 1031
13	E 27082	" 7469
14	E 27081	" 15683
15	E A 1430	PP1
16	E 27060	PP6
17	A 1567	NP
18	E 27094	Pickett 3
19	E 27095	Pickett 4-8
20	E 27102	Bulk YX Pickett 4-8
21	E 27108	W.A. X Nigerian
22	E 27097	Bulk YX EC 64376
23	E 27112	954062 X 73PP9
24		CSV-1
25		CSV-2
26		CSV-3
27		CSV-4
28		CSV-5
29		CSV-6
30	A 1864	Fast Lane (C2)
31	A 1865	Fast Lane R (C2)
32	A 1870	Fast Lane R (C2)
33	A 1897	Diallel 918 X PP
34		Local Check

*1 This test was planted dry on May 15, 1977 but could not be irrigated up due to inadequate irrigation equipment. A rain on May 22 and 23 sprouted much of the seed which emerged and then died from severe drought. This test was completely abandoned and no data collected. It had been planted in plots of 1 row (.7m apart) x 6m long in 2 replications.

TEST NO. 77090

International Maize Yield Test

Test Description, Seed Source and Purpose:

There were 27 Maize genotypes entered in this test. The entries were composites or of various types of hybrid construction as listed in Table 19. All entries came from Africa and were grown at Sanaa for evaluation of growth and production as potential new varieties or hybrids.

Plot Size and Treatment:

The plot size was three rows, six meters long and .7 meter between rows. The center row to be harvested for yield with the two outside rows acting as border or buffer rows. The original test design was for six row plots about twice as long but a shortage of research land dictated a reduction in size.

The seed was planted in hills of three seed each every 40 cm or about 15 hills per plot row. The hills were thinned to two seed per hill.

Plans were to irrigate this test as needed.

Results:

This test was planted dry on May 15, 1977. A rain on May 22 and 23 caused germination and emergence. Crusting was bad and most seedlings had to be dug out by hand. The irrigation system was inadequate to irrigate this test very well plus the land was quite unlevel. The test was partially irrigated through the season. Dought stress damaged the growth.

Yield results were not very high compared to sorghum. These entries did not look too promising compared to sorghum which is better adapted to dry land and rain fed conditions.

Table 19. Yield and Days to Pollination of Twenty-Seven Maize Genotypes in a Test at Sana'a, Yemen, 1977. Test Number 77090.

Rank No.	Entry No.	Pedigree *1	Type	Source	% Stand	Days To 50% Bloom *2	Grain Yield k/ha
1	20	PNM-1	Composite	Zaire	55	130	1904
2	22	ESC X EN3	Variety Cross	Zambia	82	118	1766
3	12	H76 111	Closed Pedigree	Kenya Seed Co.	67	116	1634
4	14	H512	Single Cross X Variety Cross	Kenya (Commercial)	70	116	1591
5	19	(MIX.1 X COL.)ETO	Composite	Zaire	68	122	1366
6	24	ZCA X ZCZ	Composite Cross	Zambia	66	118	1285
7	13	ALEMAYA	Composite	Ethiopia	78	122	1253
8	15	H632	Three-Way Cross	Kenya (Commercial)	84	124	1185
9	5	H613C	Single Cross X Variety	Kenya (Commercial)	77	123	1170
10	21	SR52	Single Cross	Zambia	78	122	1120

*1 Plot Size = 3 rows 6 m long and .7 m between rows. 15 hills per row with 2 seeds planted per hill. Center row harvested for yield.

*2 Planted dry on May 15, 1977. Rainfall on May 22 and 23. Inadequate irrigation facilities made proper irrigation impossible so dry weather damaged the growth cycle of this crop.

Table 19. (Continued)

Rank No.	Entry No.	*1 Pedigree	Type	Source	% Stand	*2 Days To 50% Bloom	Grain Yield k/ha
11	11	H5020	Closed Pedigree	Kenya Seed Co.	73	130	1085
12	8	EAH 6303	Three-Way Cross	EAC	76	126	1004
13	4	H 612 (R) C5	Single Cross X Variety	EAC	75	124	969
14	23	ZCA	Composite	Zambia	73	123	966
15	1	H611C	Variety Cross	Kenya (Commercial)	48	124	958
16	9	EAH 6304	Three-Way Cross	EAC	92	120	851
17	17	KwCB	Composite	Uganda	72	128	823
18	10	H5013	Closed Pedigree	Kenya Seed Co.	74	129	781
19	7	EAH 6302	Three-Way Cross	EAC	88	128	734
20	26	SR52 X Ec Em	Single Cross X Variety	Zambia	80	122	699
21	25	SR52 X 63JSC1	Three-Way Cross	Zambia	80	126	674
22	3	H612C	Single Cross X Variety	Kenya (Commercial)	82	124	654
23	2	H611 (R) C5	Variety Cross	EAC	75	124	638
24	6	H613 (R) C5	Single Cross X Variety	EAC	90	126	622
25	18	KwCA X KwCB	Composite Cross	Uganda	55	130	564
26	27	UCA (F) C6	Composite	Tanzania	68	128	522
27	16	KwCA	Composite	Uganda	80	128	488

TEST NO. 77091

Superior Selected Grain Sorghum Experimental
Variety Genotype Yield Test

Test Description, Seed Source and Objectives:

There were seven sorghum genotypes entered in this test to obtain another year of performance data. These seven genotypes were selected and tested in this breeding program in years past and were presented to us in 1977 as good adapted genotypes. Seed came from a prior test in 1976 (76019001).

Plot Size and Treatment:

The plot size was one row six meters long, .7 meter between rows with four replications. The test was supplied with irrigation water as needed.

Results:

Yield and other agronomic data are presented in Table 20. The grain yields are fairly similar for all entries and are in the average range for yield throughout the research farm. The different lines are all quite close in maturity and height.

The plant and head phenotypes were not as good as we would have liked as shown by the agronomic ratings.

There was a considerable amount of phenotypic variation within genotypes indicating that the lines were quite heterozygous yet and needed several generations (years) of selfing and selection to purify to homozygous lines.

Pressure from the Ministry of Agriculture to release something whether it was ready or not caused the release of Sanaa 7 into the Yemen Regional Sorghum Trials and to our own on-farm testing program in 1978.

Table 20. Yield and Other Agronomic Data from a Yield Test (77091) of Superior Selected Grain Sorghum Experimental Variety Genotypes at Sana'a, 1977.

Table and Rank No.	*1 Entry	Seed Origin	*2 Seedling Vigor	*3 Days to 50% Bloom	*4 Plant Ht. Cm	*5 Agronomic Rating Plant	*5 Agronomic Rating Heads	*6 % grain by wt. in heads	Grain Yield k/ha
1	Sana'a 7	76019001	2	120	111	2.75	3	79.3	3660
2	" 1	"	1.75	134	125	2	2	73.9	3478
3	" 2	"	1.75	128	112	2.5	2.5	75.	3420
4	" 5	"	1.75	121	111	2	2.25	77.8	3387
5	" 4	"	1.5	132	105	2.5	1.75	72.6	3274
6	" 3	"	1.75	136	98	2.5	2.25	74.3	3002
7	" 6	"	1.75	129	116	2.25	2.25	70.6	2805

*1 Plot size = 1 row (.7m between rows) x 6m with 4 replications.
*2 Seedling vigor rating scores: 1=good, 2=average, 3=poor.
*3 Planted dry on April 27 and irrigated on April 29, 1977.
*4 Distance from ground level to the top of the head of an average plant.
*5 Agronomic rating scores of mature plants and heads: 1=good, 2=average, 3=poor.
*6 Threshing percentage of whole, air dried heads.

TEST NO. 77092

Pearl Millet Yield Test

Test Description, Seed Source and Objectives:

This test was composed of 44 entries of pearl millets from seed sources within the project. These entries had been grown in five different tests in 1976. These entries could be compared better if all were in one test. The objective was to select one or more pearl millets with potential production possibilities for the Sana'a area. Table 21 gives the pedigree, seed origin by test and what little test data we were able to collect.

Plot Size and Treatment:

The plot size used was one row six meters long and .7 meter between rows in two replications. Plots of four to six rows and twice as long with four replications are much more accurate but a shortage of research land caused this test, as well as many others, to be reduced in size or not be planted at all. This test was scheduled for a minimum irrigation regime to simulate rain-fed droughty conditions.

Results:

This test was planted dry in field E on May 15, 1977. A rain on May 22 and 23 caused the germination and emergence of all of the usually heavy planting of seed. The farm irrigation system proved incapable of irrigating this test. No more rain came so everything eventually dried up. The stand was too thick and could not be thinned on time nor without pulling out big clumps and injuring the remaining plants.

As indicated in the table there was almost a perfect stand, in fact the population was actually several times more than it should have been. The plants grew to about 100 cm and died without heading or producing any grain yield. The test was abandoned.

Table 21. Pedigree, Seed Origin and Some Agronomic Data from a Pearl Millet Yield Test (77092) AT Sana'a, 1977.

Entry No.	*1 Pedigree	Seed Origin	Percent Stand	*2 Ht. in cm
1	Early Millet	76061	100	100
2	IR Millet	"	97.5	105
3	75 Composit	"	100	85
4	Local	"	100	95
5	Composit I	76064	97.5	95
6	Composit II	"	100	92.5
7	Bornu	"	100	105
8	Sereae	"	100	115
9	NEP 67	75055	100	100
10	NEP 104	"	97.5	90
11	NEP 218	"	100	105
12	EX Bornu	"	100	120
13	Serere	"	100	100
14	NEP 18	76060-19	100	100
15	NEP 18	76060-20	100	100
16	NEP 18	76060-23	100	95
17	" 18	" -28	100	115
18	" 18	" -51	100	85
19	" 18	" -53	100	90
20	" 18	" -54	100	105
21	" 18	76060-70	100	105
22	" 104	" -180	100	98
23	" 69	" -73	95	70
24	" 218	" -17184	97.5	75
25	Sereae Comp.	76060	97.5	115
26	Bornu	76060	100	135
27	"	76060-75 SAN 201	100	105
28	"	76060-75 SAN 202	100	130
29	"	76060-75 SAN 411	97.5	120
30	"	76060-75 SAN 412	100	100
31	Local		100	105
32		76060-75 SAN 414	100	95
33		76060-75 SAN 415	100	92.5
34		76060-75 SAN 416	97.5	100
35		76060-75 SAN 417	100	105
36		NES 17171	100	105
37		76004001	100	85
38		001	100	105
39		002	100	105
40		002	100	105
41		003	100	75
42		003	100	100
43			100	110
44	Local		100	115

*1 Plot size = 1 row (.7m between rows) X 6r with 2 replications.

*2 Average distance from ground level to top of plant growth of the plot.

TEST NO. 77093

F_3 Populations For Single Plant Selections

Test Description, Seed Source and Objectives:

There are 76 populations in the F_3 generation entered in this test. The parentages and seed sources are given in Table 22. The objective of this planting, as this is really not a test, is to provide sources of good germplasm from which to make single plant selections for further evaluation and reselection in the breeding program.

Plot Size and Treatment:

The plot size used for each population was only one row six meters long with .7 meter between rows. A shortage of research land prevented using larger plots as would have been more desirable. These plots were supplied with irrigation water as needed.

Results:

About three hundred fifty single plant selections were made, of which one hundred four were selected to be entered in Test 78099 in 1978. Bulk seed was collected from within populations for planting for more selections in 1978.

Pollen was also collected from within these populations for pollinating steriles in random mating populations.

Some of these populations seemed to produce excellent dual purpose (grain and forage) genotype segregates. New crosses will be made with the parents involved to produce more populations and seed.

Seed of these populations was supplied to the UNDP at Taiz who selected many superior genotypes adapted to their environment.

Table 22. Pedigree and Seed Source of Seventy Six Populations in the F_3 Generation for Single Plant Selections at Sana'a, 1977. Test No. 77093.

*1 Entry No.	*2 Pedigree	Seed Source	Ht. in cm
1	NES 110 X NES 6970	76026-001	100
2	" X NES 6971	-002	95
3	" X NES 6972	-003	110
4	" X NES 6973	-004	110
5	" X NES 6974	-005	90
6	" X NES 6975	-006	110
7	" X NES 6976	-007	95
8	" X NES 6977	-008	110
9	" X NES 6978	-009	135
10	" X NES 6979	-010	67
11	" X NES 6981	-011	115
12	" X NES 6986	-012	70
13	NES 1500 X NES 6973	-013	120
14	" X NES 6975	-014	95
15	" X NES 6976	-015	105
16	" X NES 6983	-016	90
17	NES 2141 X NES 6971	-017	120
18	" X NES 6972	-018	105
19	" X NES 6973	-019	97
20	" X NES 6974	-020	110
21	" X NES 6975	-021	140
22	" X NES 6976	-022	85
23	" X NES 6978	-023	117
24	" X NES 6982	-024	140
25	" X NES 6983	-025	130
26	NES 3329 X NES 6970	-026	120
27	" X NES 6971	-027	140
28	" X NES 6972	-028	170
29	" X NES 6973	-029	165
30	" X NES 6974	-030	150
31	NES 3329 X NES 6975	-031	120
32	" X NES 6976	-032	120
33	" X NES 6977	-033	110
34	" X NES 6978	-034	140
35	" X NES 6979	-035	140
36	NES 3329 X NES 6980	-036	110
37	" X NES 6982	-037	135
38	" X NES 6985	-038	130
39	" X NES 6986	-039	100
40	IS 509 X NES 6970	-040	120

*1 Plot size = 1 row (.7m between rows) X 6m in a single replication.
*2 These crosses were made by ALAD at Lebanon in 1975.

Table 22. (Continued)

*1 Entry No.	*2 Pedigree	Seed Source	Ht. in cm
41	IS 509 X NES 6971	76026-041	130
42	" X NES 6974	-042	137
43	" X NES 6978	-043	130
44	" X NES 6979	-044	147
45	" X NES 6980	-045	150
46	" X NES 6982	-046	150
47	" X NES 6983	-047	117
48	" X NES 6986	-048	160
49	NES 2197 X NES 6970	-049	150
50	" X NES 6971	-050	130
51	" X NES 6972	-051	127
52	" X NES 6973	-052	130
53	" X NES 6974	-053	138
54	" X NES 6975	-054	120
55	" X NES 6976	-055	160
56	" X NES 6977	-056	140
57	" X NES 6978	-057	170
58	" X NES 6979	-058	140
59	" X NES 6980	-059	125
60	" X NES 6981	-060	138
61	NES 2197 X NES 6982	-061	130
62	" X NES 6985	-062	140
63	" X NES 6986	-063	124
64	IS 9958 X NES 6970	-064	135
65	" X NES 6971	-065	60
66	" X NES 6972	-066	100
67	" X NES 6973	-067	100
68	" X NES 6974	-068	126
69	" X NES 6975	-069	106
70	" X NES 6977	-070	140
71	" X NES 6978	-071	120
72	" X NES 6979	-072	180
73	" X NES 6981	-073	110
74	" X NES 6982	-074	100
75	" X NES 6983	-075	140
76	" X NES 6984	-076	140

TEST NO. 77094

UNDP/FAO Grain Sorghum Yield Test

Test Description, Seed Source and Objectives:

Seven experimental sorghum genotypes and a local check were entered in this test. The experimental genotypes were selected and seed supplied by UNDP/FAO at Taiz as being well adapted to that lower and more humid environment. The objectives were to determine if any of these seven genotypes were adapted to the Sanaa area. Taiz is warm, humid with lots of rainfall and almost tropical compared to the cool, dry uplands at Sana'a. This was a cooperative test with another donor agency.

Plot Size and Treatment:

The plot size used for this test was one row six meters long and .7 meter between rows with three replications. This test was to be stressed for moisture to simulate the droughty rain-fed conditions of the uplands.

Results:

This test was planted dry in Field E on May 15, 1977. A rain on May 22 and 23, 1977 caused the germination and emergence of the test. Irrigation facilities of the farm were inadequate and incapable of watering this test. No more rain came, so it dried up, died and was abandoned.

A list of the seven entries are given in Table 23.

Table 23. Entry List of Eight Grain Sorghum Genotypes Submitted by the FAO United Nations Development Program at Taiz for Testing at the High Elevations in Yemen. Sana'a, 1977. Test No. 77094.

*1 Entry No.	*2 Entry Name
1	IS-83
2	IS-509
3	BOI-148
4	CNAP-71
5	G-114
6	G-3
7	K-HAMAAM
8	LOCAL

*1 Plot size = 1 row (.7m between rows) x 6m in 3 replications.

*2 Planted dry on May 15, 1977 but it could not be irrigated up due to inadequate irrigation equipment. A rain on May 22 and 23 sprouted most of the seed which then came up and later died from severe drought. This test was completely abandoned and no data collected.

TEST NO. 77095

UNDP/FAO Pearl Millet Yield Test

Test Description, Seed Source and Objectives:

Three experimental pearl millet genotypes and a local check were entered in this test. The experimental genotypes were selected and the seed supplied by the UNDP/FAO at Taiz. The objectives were to determine how well these genotypes, that were well adapted to the lower, humid and high rainfall area of Taiz, were adapted to the high elevation, cool, dry uplands of Sanáa. This was a cooperative test with another donor agency.

Plot Size and Treatment:

The plot size used for this test was one row six meters long and .7 meter between rows with three replications. Larger plot sizes would have been desirable but the land was not available. This test was to be stressed for moisture to simulate the droughty rain-fed conditions of the uplands.

Results:

This test was planted dry in Field E on May 15, 1977. A rain on May 22 and 23, 1977 caused the germination and emergence of the test. Irrigation facilities of the research farm were inadequate and incapable of watering this test. No more rains came so the test dried up, died and was abandoned.

A list of the three entries are given in Table 24.

Table 24. Entry List of Four Pearl Millet Genotypes Submitted by the FAO United Nations Development Program at Taiz for testing at High Elevations in Yemen. Sana'a, 1977. Test No. 77095.

*1 Entry No.	*2 Pedigree
1	N. W. Composite
2	EX - BORNA
3	D. TIHAMA
4	LOCAL

*1 Plot size = 1 row (.7m between rows) x 6m in 3 replications.

*2 Planted dry on May 15, 1977 but it could not be irrigated up due to inadequate irrigation equipment. A light rain on May 22 and 23 sprouted most of the seed which emerged and grew until the rainfed moisture was depleted. The plots then dried up and died. This test was completely abandoned and no data collected.

TEST NO. 77096

Sudangrass Observational Test

Test Description, Seed Source and Objectives:

Twenty eight sudangrass genotypes were entered in this test for a visual evaluation as to their adaptation to this environment. The seed came from two project tests in 1975. The pedigree, origin and seed source are given in Table 25.

Plot Size and Treatment:

The entries in this test were put in plots of one row six meters long with .7 meter between rows with a single replication. This test was to be stressed for moisture to simulate droughty rain-fed conditions.

Results:

This test was planted dry in field E May 15, 1977. A rain fall on May 22 and 23, 1977 caused the germination and emergence of the seed. The research farm irrigation system was incapable of irrigating this test so it dried up, died and was abandoned.

Table 25. Pedigree, Origin and Seed Source of Twenty Eight Sudangrass Genotypes Entered in an Observational Test at Sana'a 1977. Test No. 77096

*1 Entry No.	*2 Pedigree	Origin	Seed Source
1	IS 8819	72-KF 8239, 74 TR 574	75001-101
2	IS 608	4475, 72 TA 3001	-102
3	IS 3289	TA 2995 74 TA 17537	-103
4	IS 3309	5729 569	-104
5	IS 147	4283 555	-105
6	IS 3201	5685 564	-106
7	IS 602-1	4469 504	-107
8	IS 3201	TA 2957 521	-108
9	IS 609	4476 510	-109
10	IS 3211	5687 565	-110
11	IS 8826	8242 575	-111
12	IS 3283	TA 2978 523	-112
13	IS 2695	5438 520	-113
14	IS 602-22	TA 2976 505	-114
15	IS 3274	5714 72 K 5714	-115
16	NES 2798	TA 3014 74 TA 17503	-116
17	IS 604	4471 506	-117
18	IS 615	4482 511	-118
19	NES 1336		75002
20	NES 1354		"
			"
21	NES 1320		"
22	NES 1340		"
23	NES 1312		"
24	NES 1347		"
25	NES 1306		"
26	NES 1319		"
27	NES 1352		"
28	NES 3201		"

*1 Plot size = 2 rows (.7m between rows) x 6m long in a single replication.

*2 Planted dry on May 15, 1977 but could not be irrigated up due to inadequate irrigation equipment. A light rain on May 22 and 23 sprouted most of the seed which emerged and grew until the rainfed moisture was depleted. The plots then dried up and died. This test had to be completely abandoned and no data was collected.

SANA'A SORGHUM COMPOSITE

Test Description and Purpose:

Seed for this test consisted of a bulk lot of sorghum seed of Yemen origin that had been grown for several years in a field-like situation where cross pollination (natural hybridization) could occur among plants and produce new genotypes. A number of heads of variable phenotype but of relatively good agronomic plant and head phenotype were selected each year to form the bulk seed supply for the following year. Also each year a number of superior single plant selections were made for head-to-row evaluations the following year. This bulk population was used to fill in border areas around the research fields. This seed (and test) was used for the dual purpose of border and of a source of new adapted genotypes.

Plot Size and Treatment:

The area planted to this bulk seed was about 300 m^2 in fields A and B. It was subjected to limited irrigation during the growing season to simulate semi-arid conditions. Single plant selections based on good agronomic phenotype of plant and head were made at maturity. Several selection trips were made through the area at different times to obtain selections of different maturities.

Results:

One hundred fifty eight single head selections of potential superior agronomic adaptation were selected for head-to-row evaluation in 1978.

NP3R DROUGHT ADAPTED RANDOM MATING SORGHUM POPULATION

Test Description and Purpose:

The sterility system in this random mating population was a genetic sterile (ms_3). This particular reselected population of NP3R had been grown and reselected in Marana, Arizona (The University of Arizona) under hot ($110^{o}F$ +-) and dry conditions. The purpose of growing this population at Sana'a was to make crosses of Yemen sorghum genotypes onto any apparently adapted steriles that may show in the population. We could then start a random mating population including adapted Yemen sorghum germplasm in a system from which to regularly select new recombinate adapted genotypes with potential for the hotter and drier regions of Yemen.

Plot Size and Treatment:

This population was planted in an area of about 100 m^2 in Field E. It was subjected to very limited irrigation to simulate semi-arid conditions.

Steriles were bagged in the population as the heads started to bloom and could be recognized as sterile or fertile. The bags were dated at the time of bagging and then pollinated some 5 or 10 days later, at full bloom of the sterile head. Pollen was collected at random throughout all of the research plots from plants with agronomically desirable plants and heads. This pollen collection and pollinating took place over a period of 2 to 3 weeks to include a range of maturities.

Results:

About 25 sterile heads were pollinated. Seed set was quite low. About 30 gms of seed was obtained for starting a population in 1978.

COOL-SHORT SEASON FERTILE AND STERILE RANDOM MATING SORGHUM POPULATION

Test Description and Purpose:

The sterility system in this random mating population was a multiple stigma genetic sterile (al al). The population had been developed, selected and adapted for maturity of grain types at the cool, high elevations in Northern Arizona (Snowflake). The purpose of growing this population at Sana'a was to make crosses of Yemen sorghum genotypes onto any apparently adapted steriles that may show in the population. We could then start a random mating population of Yemen genotypes and develop a system from which to select new recombinate adapted genotypes with potential for the short and relatively cool temperatures of the high elevations of Yemen.

Plot Size and Treatment:

This population was planted in an area covering about 800 m^2 in field D in rows .7m apart. It was given sufficient irrigation to maintain near normal growth without moisture stress since this was a crossing activity and seed set was desired.

Steriles were bagged in the population as the heads started to bloom and could be recognized as sterile or fertile. The bags were dated at the time of bagging so that they could be pollinated some 5 to 10 days after bagging. Pollen was collected at random throughout all of the research plots from plants with agronomically desirable plants and heads. This pollen collection and pollinating took place over a period of 3 or 4 weeks giving a range of maturities.

Results:

About 200 to 250 sterile heads were pollinated. Seed set was quite low compared to in Arizona. A small amount of seed (about 200g) was obtained for starting a population in 1978.

SENEGAL MILLET POPULATION

Test Description and Purpose:

The seed for this bulk population came from the Sorghum Research Project at The University of Arizona. The millet genotypes in this population originally were collected in Senegal - hence the name. The population is characterized by long (25 to 40 cm) grain type heads and short in height (50-75 cm). This population was grown at Sana'a for the purpose of selecting good agronomically adapted types with potential for the high elevations of Yemen.

Plot Size and Treatment:

This population was planted in an area of about 125 m^2 in field E. It was subjected to very limited irrigation to simulate semi-arid conditions.

Results:

A couple of kilo of bulked seed was obtained from this area. Most of the heads were very long and of a large diameter. Local Yemenii were quite impressed with their appearance. The height to the bottom of the head was about 30 to 40 cm. The heads were about 30 to 40 cm in length.

MARANA MILLET COMPOSITE POPULATION

Test Description and Purpose:

Seed for this test came from Marana, AZ through the University of Arizona and consisted of about two pounds of seed of a composite bulk from about 300 single plant selections at Marana in 1976. The purpose was to select single plants adapted to the high elevations of Yemen as at Sana'a.

Plot Size and Treatment:

This bulk seed was planted in an area covering about 75 m^2 in Field A. It was subjected to limited irrigation during the growing season to simulate semi-arid conditions.

Results:

About 30 selfed single heads were selected of good agronomic size and early maturity. These are to be grown out in individual plots in 1978 for furtner adaptive evaluation.

BIG-HEADED PEARL MILLET POPULATION

Test Description and Purpose:

Seed for this test consisted of a bulk lot of pearl millet seed of Yemen origin and purported to have rather long (large) heads. The purpose was to reselect good agronomic plants and heads adapted to the high elevations of Yemen as at Sana'a.

Plot Size and Treatment:

This bulk seed was planted in an area covering about 500 m^2 in field D. It was to have been in rows .7m apart subjected to limited irrigation during the growing season to simulate semi-arid conditions. Heads of good agronomic types were to have been selected for head-to-row evaluation in 1978.

Results:

This test was planted dry and an attempt made to irrigate it up but inadequacies of the irrigation system prevented adequate irrigation. The field was also not level. The heavy soil crusted badly and prevented emergence. There was less than one percent emergence so this field had to be completely abandoned. No selections were made or any results obtained.

- Section 5 -

Short Term Consultants (TDY)

The short term consultants that made their actual visits to Yemen during the calendar year 1977 to assist with project objectives are listed below. These consultants made individual trip reports which are a matter of record elsewhere.

Dr. Donald Tuttle, Entomologist:
12 October 1977 thru 12 November 1977

Mr. Dale Bucks, Irrigation Specialist:
12 October 1977 thru 12 November 1977

- Section 6 -

Major Problems Encountered and Actions Taken Towards Solving These Problems

1. The first major problem encountered in-country with a major bearing on basic project activities and their success was the extreme variability found in the field research plots throughout the season. This problem is described in some detail in Section 2 "Field Procedures for Preparation, Planting and Care of the Research Plots". Such problems created variable research data with relatively low reliability which in turn would hinder progress toward our objectives. It was important that the procedures be improved if at all possible.

To find solutions I started by consulting with professional agronomists and plant breeders with other donor agencies such as the UNDP/FAO at Taiz and the German Farm at Sana'a. The general plan of furrowing out, pre-irrigating, planting in hills, etc. was devised to copy the more successful practices of these other more experienced donor agencies and of the Yemenii farmer. TDY personnel from the University of Arizona in the areas of soils and desert irrigation, Dr. Turner and Mr. Bucks, were brought to Yemen to assist. Appropriate new equipment was ordered to make it possible to carry out the new procedures. A detailed description of the revised plans are found in Section 2 of report Number 3.

2. There was considerable concern over the stem borer problem and its damage. An Entomologist (Dr. Tuttle) was brought to Yemen on TDY to survey the entire insect situation. A more intensive chemical control procedure was instituted in 1978 with a new chemical, new sprayers and more personnel assigned to work only on this problem.

3. We had a bad weed and weed control problem in the research plots at Sana'a.

Mr. Fred Arle, a weed control specialist came to Yemen on TDY to look at this particular problem and the general weed problems in the country at the particular time of his visit. Later, dry powder herbicides were shipped in and some liquid type herbicide was hand carried.

4. A major problem for the plant breeder and agronomist was the lack of vehicles and drivers to make it possible to see Yemen agriculture. There were no vehicles available for the use of the University of Arizona project personnel during the crop season of this first year. I walked to work and walked home. The vehicles were kept by USAID personnel. There was only a couple of quick trips to Taiz that first year during the crop season. I had no opportunity to get out into the agricultural areas of the uplands every few weeks to observe farming practices and later to see different types of sorghum and the ways they were handled and utilized.

In brief I was in the position of attempting to work with material I had never seen nor was I able to see the different types grown to get an idea of what I was trying to improve on or to see where and under what conditions they would be grown and used.

Since I was new in the country I asked diplomatically about vehicles and travel. I received the unmistakable impression that travel was a privilege for administration, primarily USAID, and that there was no understanding on the part of USAID of just why I needed to get out and look around.

This problem was only solved by the eventual arrival of more vehicles for the Mission and projects. There was little that we could do on short notice.

We were unable to bring over TDY personnel early on to assist with problems until more vehicles were on hand.

5. The need for equipment and supplies was a two pronged problem. First, simple things like seed envelopes, selfing bag staplers, etc. were not available in Yemen. These had to be ordered from the United States in the case of this project. Other equipment like laboratory scales, threshers, soil probes, etc., etc., also had to be ordered. There was virtually no equipment on the project.

The second part of the problem arose in that incoming supplies took from 3 months to over a year by air freight and 8 months to 2 years by surface ship. Customs clearances alone could take one to three months.

The magnitude of these problems fluctuated with time and never were solved except to order plenty of what you needed and hope you got some of it before your tour of duty was finished.

Some supplies were shipped by U.S. State Department pouch out of necessity and even some of these took 6 months by surface pouch.

The project was just getting fairly well supplied in most areas by the end of the first two year contract.

6. The professional project (030) personnel never met the Minister of Agriculture nor were we ever invited to attend meetings at the Ministry involving USAID and Yemen officials about the project or its activities. The advice or input of project professionals was never solicited.

- Section 7 -

Future Plans and Suggestions

A. Future Plans:

1. Proceed with development of superior sorghum and millet genotypes for production of forage and grain in Yemen.
2. Develop procedures and plans for on-farm testing and of potentially superior sorghum genotypes for adaptation to upland dry-land agricultural areas. Locate cooperators for these on-farm tests.
3. Proceed with field agronomic production research as resources permit.
4. Proceed with development of a second agricultural research station at Al Jarubah as resources and authority permits.
5. Implement new field research planting and other field procedures in 1978.
6. Complete new project laboratory, office and automobile repair facilities as soon as possible.

B. Suggestions:

1. Project professional personnel be permitted to be consulted or have some input into USAID and the Yemen Government regarding project activities.
2. USAID allow contractors to utilize the more rapid shipping routes and procedures utilized by the U.S. Government to get needed supplies and equipment into Yemen to do the job we are there for.
3. Project professional personnel be given more freedom of vehicles, drivers and travel in order to see Yemen agriculture, to see how it operates and to see what it needs.

Project Accomplishments and a Summary of Some Field Research Results

A. Project accomplishments:

1. Project personnel participated in periodic meetings with other donor agency agricultural research personnel held about every two months at the Ministry of Agriculture. The status and progress of all projects were reviewed and activities coordinated.

2. It was suggested by this project (030) to the group of cooperative donor agencies that the cooperative tests need not all be replicated yield tests. A system of Regional Observational Tests with only one replication was instituted thereby making it possible to visually screen more material at more locations for each other with less work and expense. This system is used by sorghum researchers across the United States. Regional Yield Tests continued but with better selected materials.

3. Plans were developed for improving the field research procedures to make possible more reliable data.

4. Areas of need for TDY Consultants to help solve problems were identified and scheduling of these selected personnel was initiated. Many of these specialists did not make their visits until in 1978.

5. Training of local project personnel was initiated in routine field research project activities and the proper operation and care of technical equipment. A program of classes in the project taught by the plant breeder and agronomist was initiated to train the local employees in scientific matters and procedures.

6. The new well was improved and irrigation pipe purchased to make available more irrigation water as needed and thus make more research land area usable.

7. Construction was started on a new building for project laboratory, auto repair and office spaces. There were practically no office, laboratory or seed storage spaces available previously.

8. Long order lists of needed equipment and supplies for the project were initiated. These items make possible more project activities carried out in a better manner. These items were not available locally.

B. Summary of some field research results:

1. A systematic, simplified selection and genotype evaluation process sequence of head-to-row, preliminary yield test, advanced yield test and elite yield test was instituted. Forage yield as well as grain yield data would be taken on elite test entries. Elite test entries could also be evaluated in on-farm tests.

2. In a Hybrid Advanced Generation Yield Depression Test (77078) the F_2 generation production data indicated equal or better grain yields than the F_1. The F_3 grain yields were lower. This is similar to results noted at the University of Arizona. This would indicate the possibility of successfully using at least one further generation of grain of a hybrid for seed for the next crop.

3. In a Date of Planting Test (77086) both entries of sorghum and of millet all retained their respective days to 50% bloom throughout all the dates of planting. This infers that regardless of when a crop is planted (within the time frame of this test) it will tie up the land for the same length of time. Height decreased with each date of planting indicating probable less forage yields with each later date of planting.

4. Began locating, designing and/or developing germplasm resources with wide genetic variability from which to select superior genotypes. Some of these systems were designed to give superior germplasm for different environments, not just Sana'a.

5. F_2 population seed of a number of populations from 77093 that gave outstanding segregates was given to the UNDF/FAO project at Taiz to select genotypes suitable for their environment.

6. A cytoplasmic male sterile line (A line) with a maintainer line (B line was identified. It had a good phenotype for the environment so hopefully it will have potential for possible future hybrids.

7. Determined that most all United States adapted sorghum germplasm is rather unadapted to the high elevation uplands of Yemen. The plants are very short with a minimum of forage production.

8. Plans were made and approved by USAID, at the request of the project 030 plant breeder, to proceed with a Yemen Sorghum Seed Collection of native varieties. This collection got underway in the fall of 1977. This project, through USAID, furnished the vehicles, drivers, vehicle operating costs, all salaries, all travel, per diem and all equipment and supplies needed. The UNDP/FAO at Taiz furnished 2 to 3 experienced technicians to do the collecting.