PN-ABK-199
47156

REPORT

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Phatlalatso Ea Temo

RD-R-117

FINAL REPORT
MAIZE VARIETY TRIALS
(1986-1990)

by

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October, 1991

Agricultural Research Division and the USAID Funded LAPIS Project
Ministry of Agriculture, Cooperatives and Marketing

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INTRODUCTION

Maize is the most important crop grown in Lesotho. When processed and consumed as papa, it constitutes about 40% of the daily diet. The average land area planted to maize between 1973 and 1989 was approximately 137,000 ha, or 44% of the total cultivated land.

Research on maize is an on-going endeavor and an integral part of this research program has been variety testing. Variety testing is a continuing process, as new varieties and new materials which have insect and disease resistance and are more drought tolerant or have higher yields, are evaluated. These new materials must be tested under local environmental conditions to see if they are adaptive to Lesotho. The introduction of new maize varieties is by far the easiest and most economical way to improve yields and other desirable characteristics.

A great deal of research is being conducted throughout the Southern African region to improve maize production. The Agricultural Research Division of MOA is an integral part of that effort. For the past four years, maize varieties have been tested from seven major seed companies in South Africa and Zimbabwe. The majority of these varieties were hybrids. Maize hybrids have been known to significantly outyield open-pollinated varieties. Our research has shown that yield increases of 50 to 100% are possible by using hybrids instead of the standard open-pollinated varieties.

OBJECTIVES

1. To evaluate new varieties coming onto the market, comparing with standard maize hybrids grown in Lesotho.
2. To test maize hybrids against open-pollinated (O.P.) maize varieties on the market.
3. To determine the best-adapted and highest-yielding varieties for Lesotho.
4. To test these maize hybrids at various locations in Lesotho, and determine which varieties are adapted to particular ecological niches.

This report describes research results from a large number of maize variety trials over the past four years at the Agricultural Research Division (ARD). The ultimate goal has been to help the farmers of Lesotho make proper decisions when choosing the highest yielding varieties to plant in their fields.

MATERIALS AND METHODS

Seed was obtained from many sources, but primary suppliers were the seed companies from the RSA and Zimbabwe. Several open-pollinated standard varieties, grown in this region, were included in the trials for comparative purposes.

Trials were conducted at three locations: one in the lowlands in Maseru, and one at Leribe, both of which are at an elevation of approximately 1600m, and one in the foothills of Machache at 1850m elevation. The data was collected for four years at Maseru and Leribe, and for two years at Machache. The data often covers more than one trial per season for the same location. In addition, at Maseru, sprinkler irrigation was available, so one of the trials was irrigated each season. The irrigated data were contrasted with the dryland (rainfed) data over the years.

The trials were planted each year during the months of October and November. The seeds were planted by hand using a spacing of 1 meter between rows and 30 cm within rows. The seeds were placed approximately 2.5 to 5 cm deep, with 2 to 3 seeds per hill. Plots were thinned to 1 plant per hill when the crop was about 15 cm high. Plot sizes varied from 2 to 4 meters wide and 5 to 6 meters long.

Fertilizer in the form of N:P:K 3:2:1 (25), was applied at planting time at a rate of 300 kg/ha. Fertilizer was placed in the furrow, then covered with 4mm of soil. The seed was then planted in the furrow above and to the side of the fertilizer. There were three to four replications per test.

Weed control used was Gesaprim or Gesaprim Super, both atrazine-based herbicides. Additional hand weeding was done once or twice per season, so weed competition was seldom a factor. Cutworm and stalkborer were controlled with bait in a timely fashion in each trial.

Harvest was done by hand in May and June each year.

RESULTS

Because of the large amount of data in this report the summary tables (and graphs) are presented at the beginning of the report. The varieties which had the highest yields are considered most important, and therefore are presented first. For the reader who may be interested in maize varieties that are not presented in these tables and graphs, the appendix includes all varieties tested for the four-year period.

Yields were often good, with 5 tons/ha or more being recorded in some entries, while some tests yielded approximately 1 ton/ha depending on moisture. Of all the factors limiting production of maize in Lesotho, moisture is probably the most limiting, if everything else is done properly.

Table 1 presents average maize yields for four years at Maseru, Leribe and Machache Research Stations. In addition, the Maseru trials which received supplemental irrigation are shown. By adding irrigation yields, overall variety yields were higher. This gives the reader the information of what each variety has done under dryland conditions as well as with supplemental irrigation. For more information on the irrigation trials, refer to Table 4 and Figure 4. Figure 4 depicts some selected varieties that received supplemental irrigation.

Table 1 shows the yields in tons/ha for each variety; dryland yields ranged from 3.32 down to 2.01 tons/ha. The highest yielding maize variety for 4 years was SNK2232, followed by SNK2244. These yields are two to four times higher than those reported as average farmer maize yields in the country.

PNR473, a standard hybrid for the lowlands, was fifth in trials, with 2.74 ton/ha. The reasons for these higher yields are many, but center around good agronomic practices. Cropping recommendations by the Agricultural Research Division of MOA can be found in the Production Guideline for Maize (available at AIS, extension services, or ARD).

We hope this data will urge Basotho farmers to do a better job of farming, for if the experiment station can get these yields, the farmer has the potential to do the same. All of these varieties are now available in the RSA, or have been available as seed in Lesotho.

Table 1

Twenty Four Maize Varieties
Ranked Average Yield Ton/Ha
Over 3 Locations and 4 years (both dryland and with irrigation)

Dryland Rank	Variety	Dryland only Ton/Ha	With and Without Irrigation Overall Yield Ton/Ha	
1	SNK2232	3.32	3.75	(11)*
2	SNK2244	3.09	3.48	(13)
3	PNR6549	2.79	3.13	(15)
4	SNK2776	2.75	2.93	(8)
5	PNR473	2.74	3.36	(17)
6	SSMK2039	2.72	3.07	(17)
7	RO419	2.67	3.14	(17)
8	TX552	2.64	2.33	(6)
9	CAR7522	2.61	3.35	(11)
10	TX14	2.57	3.00	(5)
11	CG4141	2.56	2.97	(15)
12	RO413	2.52	3.00	(14)
13	CG4403	2.49	3.30	(15)
14	SNK2340	2.49	3.08	(5)
15	CAR7530	2.49	2.84	(12)
16	PNR6363	2.47	3.28	(8)
17	SNK2147	2.38	2.71	(16)
18	CG4410	2.32	2.54	(14)
19	RO430	2.25	2.80	(11)
20	CG4512	2.22	2.42	(10)
21	PNR6528	2.21	2.94	(14)
22	A293W	2.16	2.47	(12)
23	CG4502	2.05	2.43	(12)
24	A1257W	2.01	2.36	(13)

* No. of times this variety was tested in Lesotho over 4 year period

Supplemental irrigation (second column, Table 1), shows that some varieties do better or worse with irrigation, so the overall yields change somewhat. Figure 1 shows the yields of the ten top yielding varieties in Lesotho under dryland conditions. The graph indicates yields in tons/ha. Five new maize varieties stand out, including SNK2232, SNK2244, PNR6549, SSM2039 and SNK2776. SNK2232 is almost 0.8 ton/ha higher in yield than PNR473, our present standard. The only drawback with SNK2232 and SNK2244 is that they are yellow grained varieties. If the farmer is interested in white maize varieties, he would consider PNR6549, which gave perhaps 0.1 ton/ha more grain than the standard (PNR 473).

We caution you, when interpreting this data, to note the number of times each variety has been tested during this period. The larger the number of trials, the more accurate the data. Reserve judgement on TX552 until it has been more thoroughly tested. Some of the new entries, SNK2776 for example, have not been on the market long enough to be properly evaluated, but do hold potential for Lesotho. The key to selecting the better maize varieties is having time to determine dependability!

Table 2 also contributes to helping the farmer choose the proper variety of maize to grow in Lesotho. This table shows yield stability for the top fifteen maize varieties over this four-year period. Each maize variety is indicated for the number of times it was found in the top fifteen yielding maize varieties listing (2nd column of data, Table 2). Column three in Table 2 shows the number of tests that the variety had been found in the top 15 high yielding varieties. The more times a variety was tested, and the more times the variety was found in the top fifteen varieties, the better the variety. When it is noted that each maize test usually had 40 to 45 varieties (replicated 4 times), it can be seen that the good varieties must have had high yields and consistent stability, to be in this table. The percentage of time found in top fifteen (15) in column four (4) is the final estimate of stability i.e., the higher the percentage (%) the better the stability (and predictability) of the variety to produce a high yield. This percentage is calculated by dividing column 3 data into column 2 data. As an example for PNR473, 17 is found in column 3 and 11 column 2, therefore dividing 17 into 11 = 65%.

Not all varieties are found in each test, except for the standards, PNR473 and RO419. The newer entries have not been tested long enough to give good stable results, although several entries had 50% or more stability, which indicates fair-to-good stability.

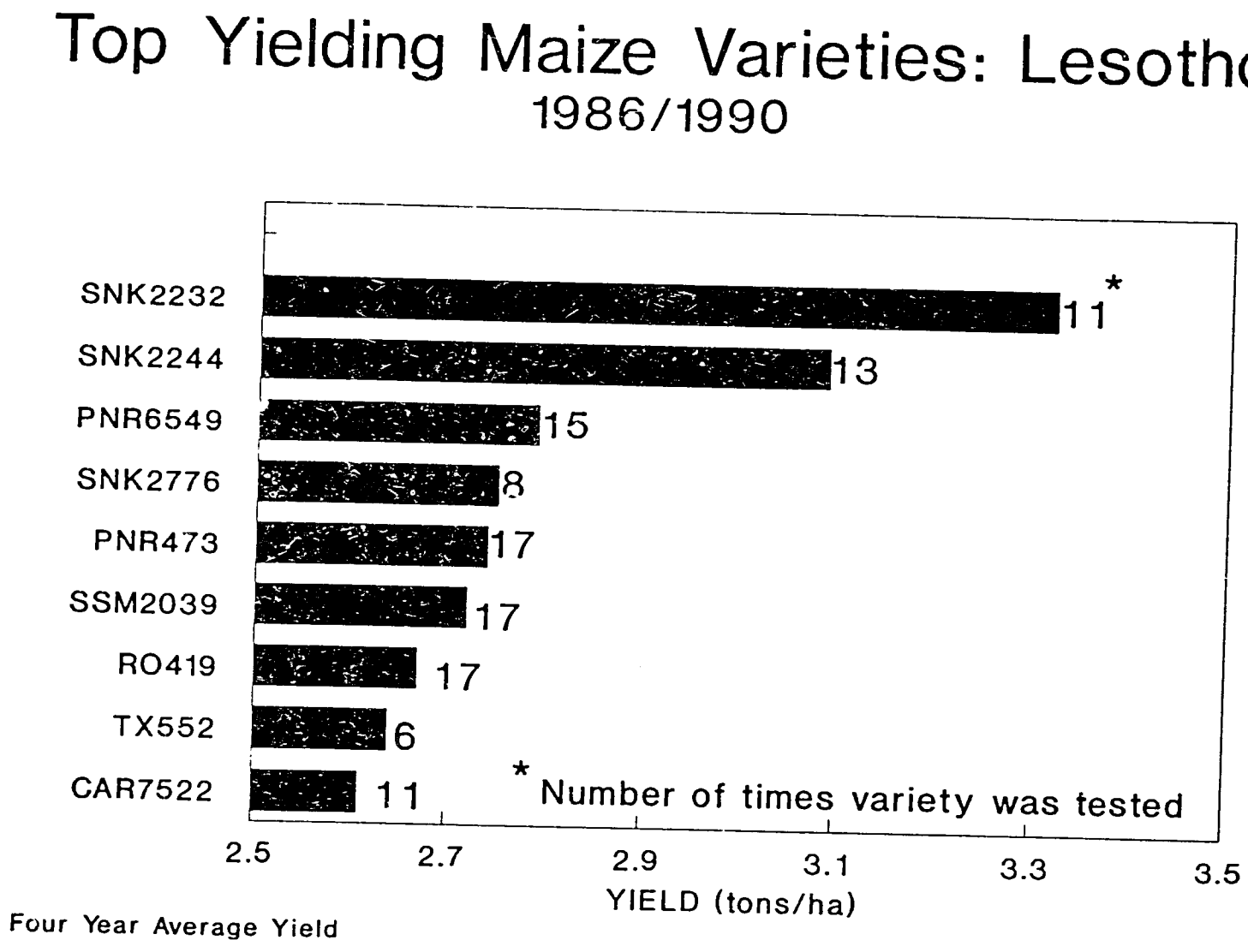
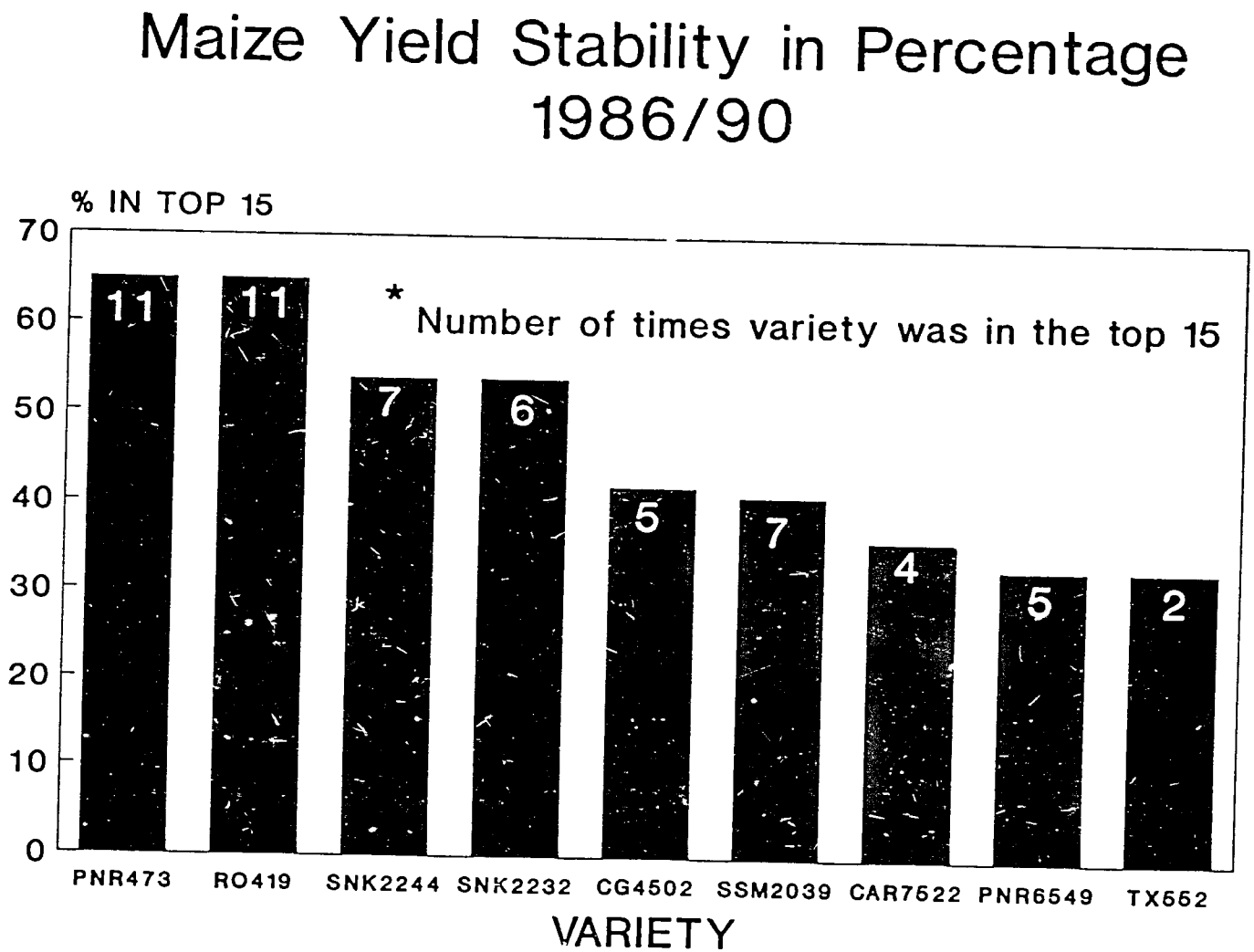


Figure 1. Average yield of nine maize varieties over three locations in four years under dryland conditions

Table 2 Yield Stability in Maize

Ranked Number of Times Maize Variety is found in the top 15 (High yielding) 1986-1990 Lesotho

Maize Variety	No. of times found in top 15 varieties	Total No. of tests in which the variety was planted	Percentage of times found in the top 15 %
PNR473	11	17	65
RO419	11	17	65
SNK2244	7	13	54
PNR6528	7	14	50
SNK2039	7	17	41
SNK2232	6	11	54
CG4410	6	14	43
RO413	6	14	43
SNK2147	6	16	38
CG4502	5	12	42
A293	5	12	42
A1257W	5	13	38
PNR6549	5	15	33
CG4141	5	15	33
PNR6363	4	8	50
SNR2338	4	10	40
CG4512	4	10	40
CAR7522	4	11	36
CG4403	4	15	27
CAR7530	3	12	25
PNR6427	2	4	50
CG4504	2	5	40
TX552	2	7	33
A1849	2	7	29
RO430	2	11	18
A1305W	2	13	15



Four Year Average Yield

Figure 2. Yield stability of selected hybrid maize varieties taken from Table 2. The higher the % the greater the stability of maize yield for the variety under Lesotho's growing conditions.

Table 3 shows performance for the various maize varieties at different locations. Machache is a foothill site (1850 m), while Maseru and Leribe are lowland sites (1600 m). Different varieties yield higher or lower, depending on their adaptability to each location. CG4502 is a good example of adaptability to a particular site. It yielded 1.45 ton/ha at Machache, 1.96 at Leribe and 2.73 ton/ha at Maseru. This variety seems to be well suited to Maseru with moderate pH (6.5±) soils, but not adapted to high elevations or Leribe acid soils of pH 5.1. SNK2232, on the other hand, provided good yields at all three sites, indicating wide adaptability. Figure 3 demonstrates this phenomena of variety adaptation to locations very clearly. SNK2232 yielded well at all locations, whereas SSM2039 yielded very poorly at Leribe, but better at Maseru and Machache. SNK2244 should be tested thoroughly at Leribe, as it was the highest yielding variety at this site, which may indicate an adaptability to low pH soils. This variety, along with SNK2232 and SNK2776, should be tested thoroughly at Leribe, as all three varieties indicate that they would do well at this northern Lesotho site. High elevation sites such as Machache, favor varieties such as SNK2232, SNK2244 and PNR6549, better-adapted, short season varieties.

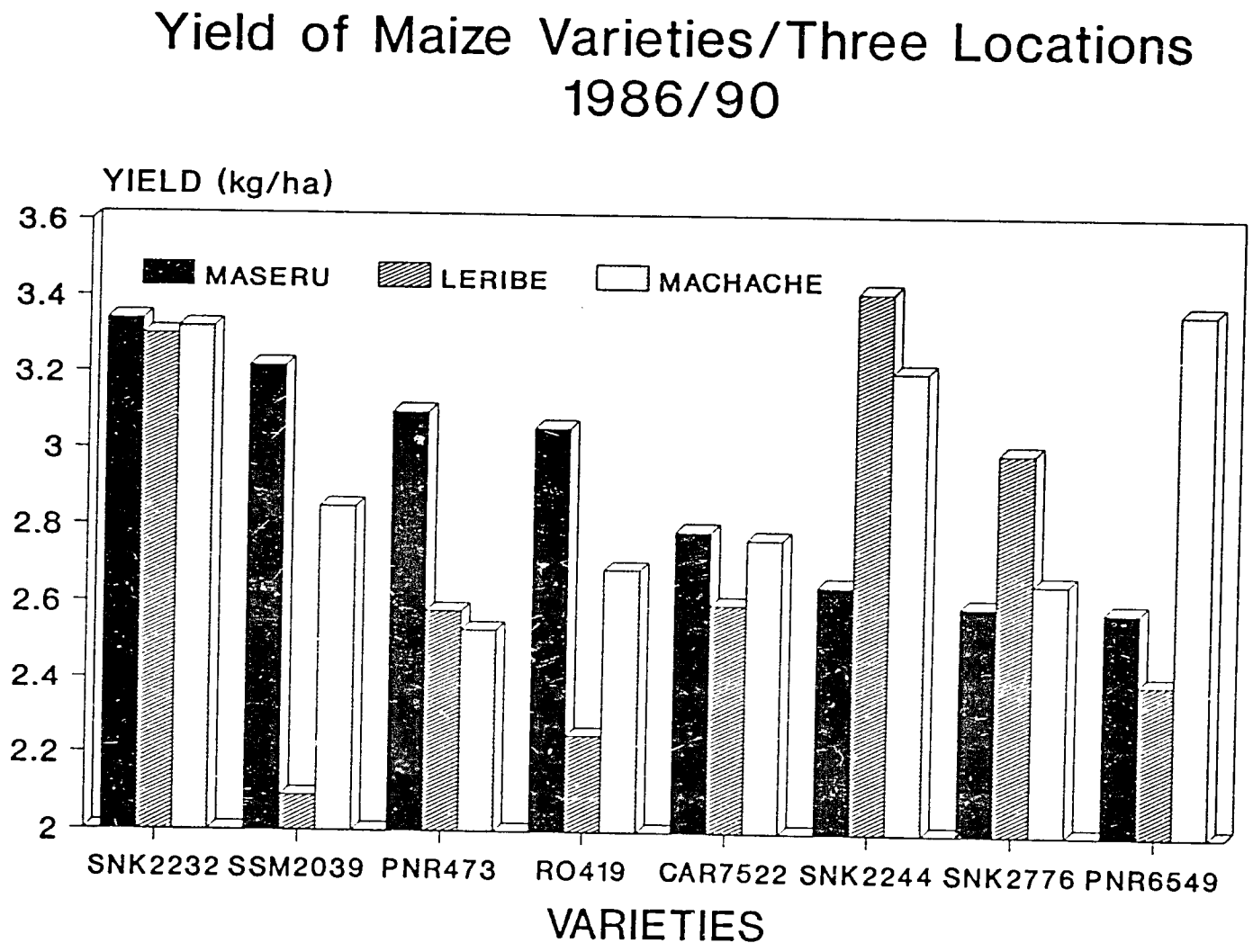
Table 4 defines yields of the maize varieties by reporting on the top fifteen varieties over the four year period at Maseru. It can be seen when looking at the variation between years and among varieties, why stability is so important in choosing the best varieties. Yields from 4 to 6 tests, Local trials and Southern African Regional Maize Evaluation and Improvement Trials (SARMEIT), are all under dryland conditions. An example of how yields fluctuate can be noted with PNR473. In 1986/87, it yielded 5.42 ton/ha and was the highest-yielding variety in the test; in 1987/88, it was 10th and yielded 1.18 ton/ha; in 1988/89, PNR473 was not in the top 15 yielding varieties; in 1989/90, it was again 10th, and yielded 1.94 tons/ha, for an average of 3.10 tons/ha which gave it 5th place in this series of tests. It must be remembered that PNR473 was tested 17 times over this four-year period, so this data is an average of 6 out of 17 trials.

Table 3

Average Maize Yields Ton/Ha
Over Three Locations
Maize Varieties Tested Over Time (2-4 Years)
1986-1990

Locations			
Machache 2 Year Average Yield Variety Ton/ha	Leribe 4 Year Average Yield Variety Ton/Ha	Maseru 4 Year Average Yield Variety Ton/Ha	Average Overall Location Ton/Ha
PNR473 2.53	PNR473 2.58	PNR473 3.10	2.74
RO419 2.69	RO419 2.25	RO419 3.06	2.67
CG4410 2.84	CG4410 1.73	CG4410 2.40	2.32
PNR6528 1.85	PNR6528 2.11	PNR6528 2.66	2.21
SNK2244 3.21	SNK2244 3.42	SNK2244 2.65	3.09
SNK2039 2.85	SNK2039 2.09	SNK2039 3.22	2.72
SNK2232 3.32	SNK2232 3.30	SNK2232 3.34	3.32
SNK2147 2.12	SNK2147 2.25	SNK2147 2.77	2.38
RO413 2.60	R0413 1.97	RO413 2.99	2.52
CG4502 1.45	CG4502 1.96	CG4502 2.73	2.05
CG4141 2.04	CG4141 2.62	CG4141 3.03	2.56
A1257W 1.13	A1257W 2.40	A1257 2.49	2.01
A293W 1.80	A293W 2.35	A293W 2.34	2.16
PNR6549 3.37*	PNR6549 2.40	PNR6549 2.59	2.79
CG4403 -	CG4403 2.61	CG4403 2.37	2.49
PNR6363 2.12	PNR6363 2.85	PNR6363 2.44	2.47
CG4504 5.02*	CG4504 2.61	CG4504 2.48	3.37
CAR7530 2.30	CAR7530 1.96	CAR7530 3.20	2.49
CAR7522 2.77	CAR7522 2.26	CAR7522 2.79	2.61
SNK2776 2.66	SNK2776 3.00	SNK2776 2.60	2.75
CG4512 2.49	CG4512 1.88	CG4512 2.30	2.22
PNR6330 1.52*	PNR6330 1.14	CG6330 2.87	1.84
TX552 2.55	TX552 2.73	- -	2.64
TX14 2.28	TX14 2.69	TX14 2.75	2.57
S. KING 1.66	S. KING 1.71	S. KING 1.05	1.47
SNK2340 1.96	SNK2340 2.42	SNK2340 3.09	2.49
A1305W 2.35	A1305W 1.53	A1305W 1.95	1.94
RO430 1.49	RO430 2.33	RO430 2.93	2.25
TX225 .68	TX225 2.76	- -	1.72

* One year only



Four Year average Yield

Figure 3. Selected maize varieties showing average yields in tons/ha at three locations over a 4 year period for Maseru and Leribe and a 2 year period of testing for Machache.

TABLE 4

Top 15 Yielding Maize Varieties
Maseru, Lesotho (Dryland Maize)
1986 - 1990 and 4 Year Average

Selected Tests

RANK	1986 - 1987 Local Trial Maize Yield		RANK	1987 - 1988 Local Trial Maize Yield		RANK	1988 - 1989 SARMEIT Trial Maize Yield		RANK	1989-1990 Local Maize Yield		RANK	Average Over 4 Years		Number of Tests Varieties Planted In
	Variety	Tons /Ha		Variety	Tons /Ha		Variety	Tons/ Ha		Variety	Tons/ Ha		Variety	Tons/ Ha	
1	PNR 473	5.42	1	A 293	1.81	1	SNK 2771	5.25	1	SNK 2232	2.29	1	SNK 2338	3.46	4
2	RO 413	5.38	2	A 1257W	1.70	2	PNR 6463	5.04	2	SNK 2244	2.17	2	SNK 2232	3.34	4
3	PNR 6429	5.18	3	A 305W	1.69	3	KDU 9051	4.61	3	PNR 394	2.14	3	SSM 2039	3.22	6
4	PNR 6528	4.94	4	CG 4512	1.67	4	CG 4141	4.54	4	PNR 6363	2.13	4	CAR 7530	3.20	4
5	RO 419	4.84	5	CG 4502	1.48	5	CAR 7707	4.41	5	SNK 2340	2.06	5	PNR 473	3.10	6
6	SNK 2340	4.81	6	TX 557	1.47	6	R 55232	4.32	6	A 293W	2.06	6	SNK 2340	3.09	4
7	CAR 7530	4.79	7	SNK 2771	1.44	7	SNK 2665	4.30	7	RO 215	2.03	7	RO 419	3.06	6
8	PNR 95	4.62	8	SLVR KNG	1.42	8	SNK 2147	4.28	8	RO 200	2.02	8	CG 4141	3.03	5
9	SNK 2338	4.58	9	SSM 2039	1.30	9	SSM 2039	4.26	9	CAR 308	1.95	9	A 305W	3.01	5
10	SSM 2039	4.45	10	PNR 473	1.18	10	CG 4410	4.26	10	PNR 473	1.94	10	RO 413	2.99	5
11	SNK 2232	4.12	11	PNR 6429	1.17	11	RO 411	4.20	11	RO 413	1.93	11	SNK 2147	2.77	6
12	SNK 2147	4.11	12	RO 419	1.12	12	CAR 7709	4.16	12	A 1305W	1.83	12	CG 4502	2.73	5
13	CG 4141	3.55	13	PNR 6528	1.10	13	SNK 2776	4.15	13	SNK 2770	1.71	13	PNR 6528	2.66	5
14	SNK 2244	3.47	14	RO 413	1.10	14	SC 501	4.04	14	PNR 6528	1.55	14	SNK 2244	2.65	5
15	PNR 6549	3.39	15	SNK 2147	1.05	15	RO 419	4.01	15	PNR 6334	1.54	15	PNR 6549	2.59	6

In these selected trials at Maseru the following is noted:
SNK 2039, PNR 473, RO 419, RO 413, SNK 2147, and PNR 6528 were found in the top 15, 3 out of 4 years.
SNK 2232, CG 4141 and SNK 2244 were found in the top 15. 2 out of 4 years.

Table 5 reports on the top fifteen maize varieties which were grown on the Leribe sub-station. Again, yields were reported for each year and may be an average of two trials per location, or perhaps one trial per year. Leribe has an acid soil with a pH of 5.1. Only dryland maize was reported, as there were no facilities for irrigation at this sub-station. SNK2244 is perhaps the most well-adapted variety for this acid soil, as it was a top yielding variety 2 out of 4 years. When averaging over four years, it was number one with a yield of 3.42 ton/ha.

Table 6 reports on the top fifteen maize varieties grown at Machache, but yields were reported for only two years: 1988/89, and 1989/90 - the first two years that maize variety testing was carried out at this sub-station. Because all varieties were not tested at this location for both years, some varieties show only one year of data. So this data was not used in the top fifteen maize variety yields for the two-year period for Machache.

Because this location has a short season, the short season varieties did best. High yielding varieties over these two years included SNK2232, SNK2244, PNR6330, GG4502 etc. Yields ranging from 2.30 to 3.32 tons/ha and demonstrate that good production came from this location when the maize was planted early, i.e., contrast 1988/89 to 1989/90 data.

The tests with supplemental irrigation, usually 1 to 2 times per season at 50 mm or 100 mm, are reported in Table 7. This irrigation took place during drought periods. The dry periods usually lasted 30 to 60 days during the major part of the growing season, and irrigation was often applied during crop pollination. Yields go up dramatically with supplemental irrigation. This, along with the natural rainfall during these periods, provided enough moisture for excellent yields.

With supplemental irrigation, yields can more than double. Figure 4 demonstrates these high yields of 6,8 or even 10 tons/ha. Yields this high are rare in Lesotho, but easily obtainable with supplemental irrigation. These yields were similar to those reported in Natal (R.S.A), under irrigation which is commonly used in that state.

These data helps the farmer to make a proper variety selection for his/her location, soil type and pH. It also may help farmers and governmental projects to make proper decisions as to whether to buy irrigation equipment in the future or not.

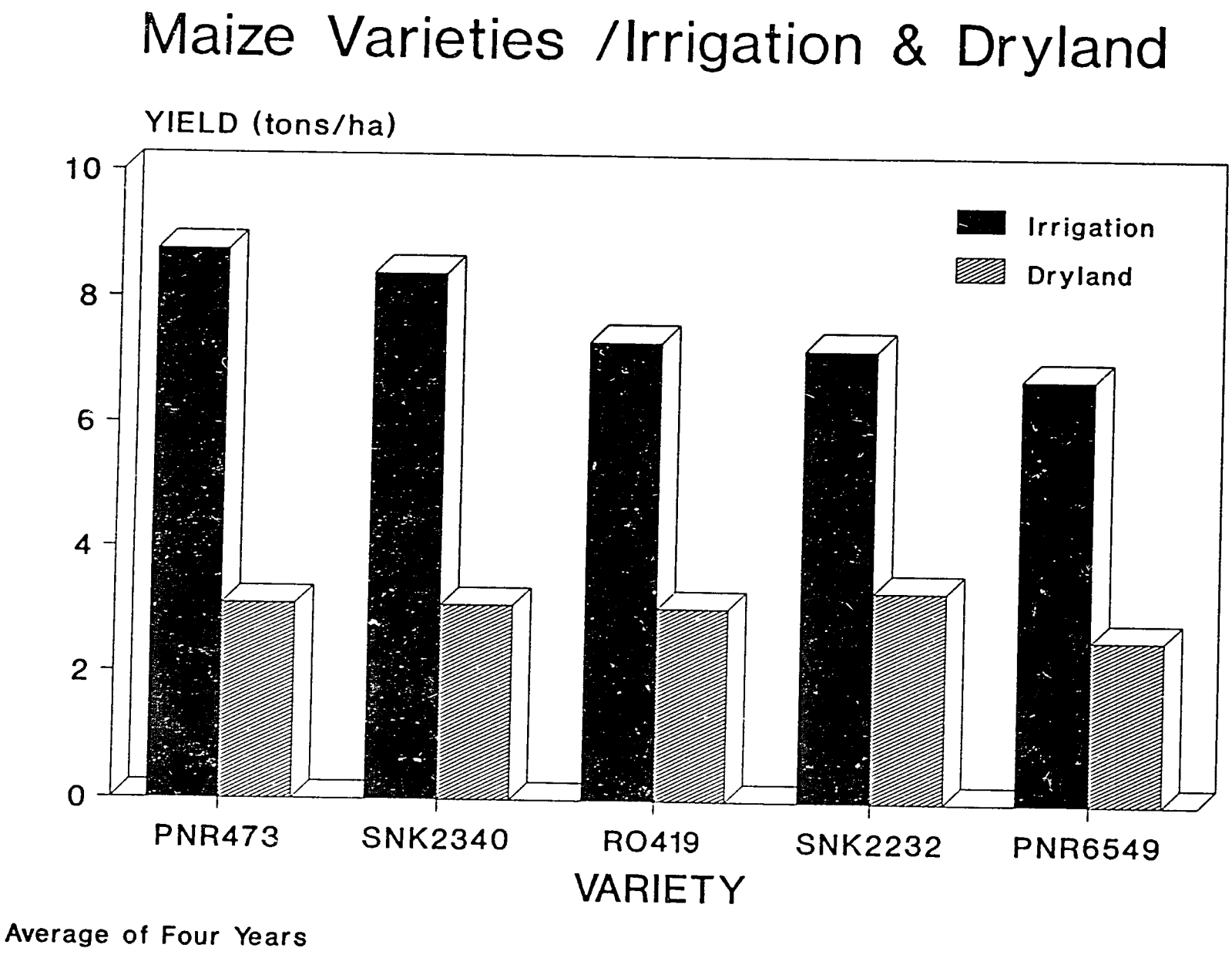


Figure 4. Supplemental irrigation on selected maize varieties, their grain yields and comparison to the same maize varieties where no irrigation (dryland) was used. Maseru Experiment Station, averaged over 3 years 1987/88, 1988/89 and 1989/90.

TABLE 5

Top 15 Yielding Maize Varieties
Leribe, Lesotho (Dryland Maize)
1986 - 1990 and 4 Year Average

Selected Tests

RANK	1986 - 1987 Local Trial Maize Yield		RANK	1987 - 1988 Local Trial Maize Yield		RANK	1988 - 1989 SARMEIT Trial Maize Yield		RANK	1989 1990 Local Maize Yield		RANK	Average Over 4 Years		Number of Tests Varieties Planted In
	Variety	Tons /Ha		Variety	Tons /Ha		Variety	Tons/ Ha		Variety	Tons/ Ha		Variety	Tons/ Ha	
1	SNK 2244	5.11	1	SNK 2244	3.29	1	ZS 225	4.15	1	PNR 6463	3.29	1	SNK 2244	3.42	4
2	SNK 2232	4.66	2	SNK 2147	2.81	2	SNK 2776	3.98	2	RO 215	3.21	2	CG 4141	2.62	5
3	CG 4502	4.64	3	TX 557	2.66	3	PNR 473	3.97	3	CRN 7515	3.02	3	CG 4403	2.61	6
4	SNK 2338	4.41	4	A 1257W	2.26	4	TX 21	3.69	4	RO 419	2.86	4	PNR 473	2.58	6
5	SSM 2D39	4.12	5	PNR 6549	2.17	5	TX 523	3.67	5	CRN 7515	2.76	5	PNR 6549	2.40	6
6	RO 430	4.09	6.	A 293W	1.98	6	TX 552	3.50	6	PNR 394	2.50	6	A 1257W	2.40	6
7	TX 14	3.95	7.	RO 419	1.67	7	CG 4512	3.47	7	CG 4141	2.47	7	A 293W	2.35	4
8	TX 560	3.95	8.	PNR 473*	1.46	8	PNR 6363	3.46	8	A 293W	2.44	8	RO 430	2.33	4
9	PNR 473*	3.92	9	CG 4512	1.43	9	TX 439	3.31	9	SNK 2338	2.43	9	CAR 7522	2.26	4
10	SNK 2340	3.92	10	TX 555	1.24	10	CG 4504	3.27	10	CAR 7564	2.36	10	SNK 2147	2.25	6
11	CG 4141	3.88	11	CG 4403	1.23	11	PNR 6334	3.06	11	CG 4410	2.34	11	RO 419	2.25	6
12	PNR 6528	3.86	12	PNR 6528	1.20	12	CG 4410	2.94	12	PNR 6528	2.34	12	PNR 6528	2.11	5
13	PNR 394	3.73	13	CG 4502	1.15	13	TX 576	2.92	13	CAR 7532	2.33	13	SSM 2039	2.09	6
14	CG 4403	3.66	14	KDU 9051	1.11	14	RO 419	2.82	14	TX 439	2.33	14	RO 413	1.97	4
15	PNR 6549	3.44	15	CG 4410	1.09	15	TX 225	2.76	15	SNR 2147	2.31	15	CG 4502	1.96	4

In these selected trials at Leribe the following is noted:
PNR 473 (standard), RO 419 and PNR 6528 were found in the Top 15 - 3 out of 4 years.
SNK 2244, CG 4141, CG 4403, PNR 6549, A 293W, SNK 2147 and CG 4502 were found in the Top 15 - 2 out of 4 years.

TABLE 6

Top 15 Yielding Maize Varieties
Machache, Lesotho (dryland, high elevation maize)
1988 - 1990 and Two Year Average

RANK	Maize Variety	1988-89 Tons/Ha	RANK	Maize Variety	1989-90 Tons/Ha	RANK	Maize Variety	Average Over 2 Years Tons/Ha
1	SNK 2232	2.36	1	CG 4504	5.02	1	SNK 2232	3.32
2	SNK 2244	1.61	2	SNK 2244	4.81	2	SNK 2244	3.21
3	PNR 6330	1.52	3	SSM 2039	4.71	3	SSM 2039	2.85
4	CG 4502	1.45	4	CG 4410	4/64	4	CG 4410	2.84
5	SNK 2340	1.38	5	PNR 6434	4.46	5	CAR 7522	2.77
6	PNR 6334	1.34	6	RO 413	4.42	6	RO 419	2.69
7	RO 419	1.33	7	CAR 7522	4.37	7	SNK 2776	2.66
8	PNR 6429	1.32	8	SNK 2232	4.27	8	RO 413	2.60
9	SNK 2338	1.28	9	PNR 394	4.27	9	TX 552	2.55
10	TX 52	1.28	10	SNK 2776	4.21	10	PNR 394	2.54
11	A 1257 W	1.23	11	CG 4512	4.18	11	PNR 473	2.53
12	ZS 225	1.18	12	CAR 7567	4.11	12	SNK 2338	2.53
13	CAR 7522	1.16	13	RO 419	4.05	13	CG 4512	2.49
14	CG 4141	1.11	14	PNR 473	4.03	14	A 1305 W	2.35
15	SNK 2776	1.11	15	A 1480	3.85	15	CAR 7530	2.30
Planted 15 November 1988			Planted 1 October 1989					

In Machache during the last two years the following varieties were found in the top 15 in two out of two years:
SNK 2232, SNK 2244, CAR 7522, RO 419, AND SNK 2776

TABLE 7

Top 15 Yielding Maize Varieties with Supplemental Irrigation
3 Trials 1987, 1988, 1989 and Three Year Average
Maseru, Lesotho
Tons/Ha (Grain)

RANK	1987 - 1988 Maize Yield Variety	Tons/Ha	RANK	1988 - 1989 Maize Yield Variety	Tons/Ha	RANK	1989 - 1990 Maize Yield Variety	Tons/Ha	RANK	Irrigated Maize (Supplemental) Variety	Average Yield Tons/Ha	Number of Tests Varieties Planted In
1	PNR 6528	13.68	1	PNR 473	9.10	1	PNR 6363	8.16	1	PNR 6528	10.31	2
2	SNK 2340	11.83	2	PNR 6528	6.94	2	A 1849	7.71	2	PNR 473	8.75	3
3	CG 4403	10.97	3	PNR 6549	6.66	3	PNR 6549	6.89	3	SNK 2340	8.39	2
4	SSM 2039	10.62	4	CG 4801	6.53	4	RO 419	6.75	4	CAR 7522	8.38	2
5	PNR 473	10.58	5	PNR 6363	6.44	5	PNR 473	6.58	5	RO 430	7.54	2
6	SNK 2147	10.58	6	A1305 W	6.39	6	A 1257	6.12	6	PNR 6429	7.47	2
7	CAR 7522	10.49	7	A1849	6.38	7	TX 557	6.08	7	RO 419	7.33	3
8	RO 430	10.07	8	A1257 W	6.33	8	RO 413	6.06	8	PNR 6363	7.30	2
9	ZS 225	9.96	9	CAR 7522	6.26	9	CG 4141	5.94	9	SNK 2232	7.23	2
10	SNK 2232	9.91	10	RO 419	6.08	10	TX 561	5.54	10	CG 4403	7.21	3
11	PNR 6429	9.47	11	PNR 6334	6.01	11	CG 4403	5.41	11	A 1849	7.04	2
12	RO 419	9.17	12	CG 4502	5.87	12	SNK 2771	5.32	12	ZS 225	7.04	2
13	RO 413	9.04	13	PNR 6330	5.79	13	RO 411	5.18	13	RO 413	6.84	3
14	SNK 2244	8.77	14	PNR 394	5.75	14	A 293W	5.02	14	PNR 6549	6.78	2
15	CAR 7530	7.72	15	CG 4410	5.62	15	SSM 2039	4.47	15	CG 4502	6.75	2

Note: The irrigations on the maize ranged from 1 to 2 (at approximately 50 mm or 5 cm of moisture/irrigation) irrigations and these were supplemental irrigations only to help the crop during the drought period. The drought period was in January 1987/88 (1x) and 1988/89 (1x) while in 1989/90 (2x) the drought was at the beginning of the season (November and December) so two irrigations were used.

SUMMARY

The first seven Tables and four Figures show summaries of maize yield data presented in various ways. From the data in Table 1, it can be determined which of the varieties is best grown in Lesotho. SNK2232, SNK2244 and SNK2776 are all excellent varieties for the country. SNK2776 is a fairly new variety. The drawback for these varieties is that they are yellow-grained, and may be unacceptable to most Basotho farmers.

PNR473 and PNR6549 are both white-grained varieties and are excellent yielders for the country. PNR473 is one of ARD's recommended standards. PNR6549 is a longer-season variety, but the data shows it to yield well most years, and it may become a newly recommended variety. RO419 is an old standard, also yielding well over the years.

TX14, a yellow-grained maize, is one of the earliest maturing varieties grown in this country, and it does moderately well, but when compared to the longer-season varieties, it can be seen that it loses almost a ton because of earliness. CG4141 is also an old standard with excellent white-colored grain, but it also yields considerably less than the highest-yielding varieties. When averaged over the years, approximately a quarter of a ton is lost, when compared to PNR473.

A relatively new variety, A293W, does not yield high compared to the other varieties, but because it is early and is white-grained, it might become more popular with Basotho farmers in time. Both TX14 and A293W, are used for late maize plantings. Figure 1 depicts this data in graph form. The best varieties to grow in Lesotho can be noted in this graph.

Table 2 presents the data in a different way and shows yield stability. Stability is a very important factor for the farmer of Lesotho, because getting a dependable yield may be as important as getting a high yield. PNR473 and RO419 (both white-grained varieties) are very stable, showing high yields in 11 out of 17 tests over the four-year period. These two varieties are not only stable, but produce high yields 65% of the time. These are the highest percentage figures for maize varieties tested in Lesotho to date. Figure 2 shows this data graphically, so the most stable varieties over the four years can be selected.

Table 3 shows how various maize varieties performed at the different locations. CG4502 exhibited its best yields at Maseru, perhaps indicating it does not do well at Machache or at Leribe, but on an almost neutral soil (pH 6.8) the variety does quite well. SNK2232 and SNK2244 yield well at all three locations, indicating wide adaptability. PNR6330 (an early yellow) has low average yields, indicating it does not do well at all in Lesotho. TX 225,

although grown in Lesotho, has such low yields, that it yields only slightly better than the open-pollinated standard, Silver King.

Comparing the various hybrids to Silver King, the farmer, or extension or research worker, can see how much the yield is improved when using the best hybrids over an open-pollinated variety. One to one and one half tons (50 to 100%) increase in yield was obtained, using the best maize hybrids standards vs the Silver King. Remember, this is over a four-year period, with many trials included in this data.

Figure 3 also helps the reader to distinguish which varieties do best at each location. SNK2232 yields well at all locations, while SSM2039 does very poorly at Leribe, not growing well on acid soils. PNR473 does better in the lowlands than in the mountains, and does not really like highly acidic soils such as Leribe. SNK2244, on the other hand, yields very well on the acid soils of Leribe and should be considered by farmers having highly acidic soils. PNR6549 exhibits a high yield in Machache, but this represents only one year's data. The point of the graph is to demonstrate that different varieties respond to different locations and that the data supports this proposition.

Tables 4, 5, and 6 define the top fifteen yielding maize varieties for each of the locations tested in Lesotho. SNK2338 provided the highest yields at Maseru for the four-year testing period (Table 4). SNK2232 was second in high yields at 3.34 tons/ha. SSM2039, CAR7530, and PNR473 fill out the top 5 yielding varieties for Maseru. All of these hybrids yielded an average of more than 3 tons/ha of maize under dryland conditions. Again, if a lowland experiment station can obtain these yields, the farmers have the potential to do the same. At Leribe, SNK2244 provided the highest yield at 3.42 ton/ha (Table 5). This variety averaged over 3 tons/ha when all other varieties yielded only about 2 tons/ha. The variety is yellow-grained, but should be considered by the farmers around the Leribe area. Certainly the top five maize varieties should be considered for production in that area. It might be noted that the other four varieties in the top five are all white-grained varieties and because they yield well, they may be considered to have some soil acidity tolerance.

Maize yields at Machache show SNK2232 as the highest yielding over a 2-year period, with a yield of 3.32 tons/ha. The data in Table 6 shows poor yields (1 to 1.5 ton/ha) in the 1988-1989 season; the reason for these poor yields is planting date. Maize in the foothills must be planted early, by late September and October. It should not be planted in November or December if high yields are desired. In 1989-90, the yields were excellent and most of the hybrid varieties yielded over 4 tons/ha, showing high potential for the foothills if planted early and, along with adequate rains, good agronomic practices are followed. The top five

maize hybrid varieties, SNK2232, SNK2244, CG4410 and CAR7522 are yellow-grained, while SSM 2039 is a white- grained variety.

Table 7 presents data from the supplemental irrigation maize trials over a three year period. This work was done at the Maseru research station, the only site with irrigation. Using 1 to 2 supplemental irrigations per season, particularly when the maize pollination process occurred, produced yields of up to 10 tons/ha.

This relates to pollination and/or lack of stress. In the case of pollination, moisture (from irrigation) helps keep the pollen viable and the pollen tube growing, therefore, better seed set per cob occurs. In addition, keeping the maize at optimum growing condition (optimum all-season moisture), helps to increase yields considerably, often doubling yield just by using supplemental irrigation 1 or 2 times at the correct time. Most years, normal rainfall can help to produce yields of 2 to 3 ton/hectare, but with extra irrigation, the yield may double or more.

Variety PNR6528 produced the highest yield with the use of supplemental irrigation. If supplemental irrigation were available, PNR6528 should be one of the prime varieties considered for Lesotho. PNR473 also yielded well, with 8.75 tons/ha of grain averaged over this three-year period. SNK2340 and CAR7522 also produced over 8 tons of grain in this experimental period. Figure 4 graphically compares the yields of 5 selected maize hybrids over the three-year period, with supplemental irrigation and dryland conditions. With only 1 to 2 irrigations or 50 to 100 mm or 2 to 4 inches of water applied at the critical time, yields of maize can be dramatically increased!

The emphasis is on SUPPLEMENTAL irrigation used only in dry times during the seasons. The rest of the season rain adequately supplies moisture for such high yields to be obtained.

This data may help farmers and personnel of governmental projects to make proper decisions as to buying supplemental irrigation in the future or not.

The keys to good production of maize in Lesotho are as follows:

1. Choose of a well-adapted, high-yielding hybrid maize variety. This is the simplest and most important decision the farmer can make.

2. Prepare a good seed bed.

3. Have a good stand (25000-35000 plants/ha).

4. Have good weed control.

5. Use adequate fertilizer.

6. Consider timing. Planting at the right part of the season, timely weed and insect control, timely fertilization and harvest are all critical for high yields of maize.

APPENDIX

Tables 8,9,10, and 11 report on all the varieties that were tested by YEARS. For example, Table 8 is all of the maize variety testing in 1986-1987. These trials were conducted at Maseru, Mafeteng and Leribe (a total of 4 trials) and all the varieties that were harvested are reported on in Table 8. The average yield for these varieties is also reported in this table, and if there is a blank where the yield/ha should have been found, then the variety was not planted in that location or tested. This is true throughout all the years and locations, and occurs simply because all the varieties could not be put into all the tests. Nevertheless, by averaging over years and locations, a very accurate picture of maize yields can be derived from this data.

Tables 12,13 and 14 in the appendix present the same data as that in Tables 8,9,10 and 11, except that instead of arrangement of data by years, the data is arranged BY LOCATION so one can see how all the maize varieties responded at one location over the years.

Appendix
Table 8

1986-1987 Maize Yields
4 Tests - 3 Locations
Lesotho

Variety	Maseru 1986/87 Ton/Ha	Mafeteng 1986/87 Ton/Ha	Maseru 1986/87 Ton/Ha	Leribe 1986/87 Ton/Ha	Average 4 tests Yield Ton/Ha
PNR 473	5.42	3.29	4.29	3.92	4.23
A 293	2.99	2.68	-	-	2.84*
CAR 7522	2.16	3.60	3.13	3.13	3.01
CG 4141	3.55	2.26	3.65	3.88	3.34
PNR 95	4.62	3.02	1.70	2.72	3.02
RO 413	5.38	3.35	-	-	4.36*
PNR 6429	5.18	4.06	2.45	3.61	3.83
PNR 6528	4.94	3.76	4.02	3.86	4.15
RO 419	4.84	3.16	4.02	3.10	3.78
SNK 2340	4.81	3.49	3.03	3.92	3.81
CAR 7530	4.79	2.91	3.74	2.39	3.46
SNK 2338	4.58	2.85	4.52	4.41	4.09
SSM 2039	4.45	2.73	4.80	4.12	4.03
SNK 2232	4.12	3.32	4.09	4.66	4.05
SNK 2147	4.11	3.28	4.67	3.16	3.81
SNK 2244	3.47	3.89	4.00	5.11	4.12
PNR 6549	3.39	2.91	4.00	3.44	3.44
A 1305W	2.60	2.95	2.08	2.23	2.47
CG 4403	2.54	4.04	3.21	3.66	3.36
A 305W	2.34	3.02	4.18	2.70	3.06
A 1257W	2.32	3.34	-	-	2.83*
CG 4305	2.17	3.59	-	-	2.88*
TX 555	1.87	3.82	-	-	2.85*
CG 4502	-	-	5.50	4.64	5.57*
PNR 394	-	-	2.91	3.73	3.32*
TX 14	-	-	4.45	3.95	4.20*
RO 430	-	-	4.23	4.09	4.16
CAR 308	-	-	4.53	3.33	3.93*
TX 560	-	-	5.87	3.95	4.91*
PNR 6427	-	-	4.93	3.38	4.16*

* 2 Location average only.

Appendix
Table 9

1987-1988 Average Yields
Maize Variety Tests
(4 Tests - 2 Locations)
Lesotho

Variety	Maseru Ton/ Ha	Maseru Ton/ Ha	Leribe Ton/ Ha	Leribe Ton/ Ha	Ave-rage with irr* Ton/ Ha	Yield Dry-land Ton/ Ha
PNR473	1.18	10.58	1.46	.96	1058	1.20
RO413	1.10	9.04	.72	-	9.04	.91
SSM2039	1.30	10.62	.70	.68	1062	.89
SNK2244	.96	8.77	3.29	-	8.77	2.12
CG4502	1.48	7.63	1.15	.54	7.63	1.06
RO430	-	10.07	-	.86	1007	.86
TX557	1.47	-	2.66	-	-	2.06
PNR6429	1.17	9.47	1.03	.67	9.47	.96
A1257W	1.70	-	2.26	.74	-	1.57(2)
AX305W	1.69	-	-	-	-	1.69*
CG4512	1.67	-	1.43	.63	-	1.24
PNR6334	-	-	-	1.55	-	1.55*
PNR6330	-	4.79	-	.35	4.79	.35*
SNK2771	1.44	-	-	-		-144*
Silver King	1.42	5.02	-	-	5.02	1.42*
A293W	1.81	-	1.98	-	-	1.90
RO419	1.12	917	1.67	.96	9.17	1.25
PNR6528	1.10	13.68	1.20	.72	1368	1.01
SNK2147	1.05	10.58	2.81	1.12	1058	1.66
CG4141	1.00	7.63	.90	-	7.63	.95
CG4403	.80	10.97	1.23	1.12	1097	1.05
KDU9051	.77	-	1.11	.92	-	.93
PNR6549	.68	5.29	2.17	.73	5.29	1.19
CG4410	.61	-	1.09	.54	-	.75
A1305W	.41	-	.43	.53	-	.46
A1849W	.40	-	1.34	.46	-	.73
TX555	.22	-	1.24	-	-	.73
SNK2340	-	11.83	-	.89	1183	.89*
CAR7522	-	10.49	-	.54	1049	.54*
ZS225	-	9.96	-	-	9.96	-
SNK2232	-	9.91	-	-	9.91	-
CAR7530	-	7.72	-	.71	7.72	.71
TX14	-	7.03	-	-	7.03	-

* One location only

Appendix Table 10

1988-1989 Average Maize Yields
Maize Variety Trials
5 Tests - 3 Locations
Lesotho

Variety	Maseru Irrigated Tons/Ha	Leribe Dry Tons/Ha	Machache Dry Tons/Ha	Average Yield Over Location Tons/Ha
PNR 473	9.10	3.69	10.3	4.61
PNR 6363	6.44	3.46	1.06	3.65
PNR 6334	6.01	3.06	1.34	3.47
PNR 6549	6.66	3.58	-	5.12
PNR 6429	5.48	2.37	1.32	3.06
PNR 6330	5.79	1.39	1.52	3.08
PNR 394	5.75	2.78	.82	3.12
PNR 95	4.91	3.43	.87	3.07
Silver King	5.59	2.85	.85	3.10
PNR 6427	5.59	2.85	.85	3.10
PNK 6528	6.94	2.45	.64	3.34
CAR 7522	6.26	3.20	1.16	3.54
CAR 308	5.15	297	1.10	3.07
CAR 7530	5.03	2.71	.94	2.89
ZS 225	4.11	4.15	1.18	3.15
SNK 2244	4.77	3.27	1.61	3.22
SNK 2340	4.95	2.44	1.38	2.92
SNK 2776	4.76	3.98	1.11	3.28
SNK 2147	3.75	1.92	.86	2.18
SNK 2338	5.42	3.40	1.32	3.38
SNK 2232	4.55	3.69	2.36	3.53
SSM 2039	4.11	2.88	.99	2.66
Sahara	3.59	1.11	.85	1.85
A 1305W	6.39	2.27	.96	3.21
A 1849	6.38	2.37	.28	3.01
A 293	5.11	2.62	.73	2.82
CG 4403	5.26	3.79	-	4.52 **
CG 4504	5.30	3.27	-	4.29
CG 4512	5.49	3.47	.79	3.25
CG 4410	5.62	2.96	1.03	3.20
CG 4502	5.87	2.94	1.45	3.42
CG 4141	5.28	2.95	1.11	3.11

Appendix
Table 10 (Cont.)

1988-1989 Average Maize Yields
Maize Variety Trials
5 Tests - 3 Locations
Lesotho

Variety	Maseru Irrigated Tons/Ha	Leribe Dry Tons/Ha	Machache Dry Tons/Ha	Average Yield Over Loc[illegible] Ton[illegible]
CG 4801	6.53	2.20	.06	2.93
RO 413	5.41	3.42	.77	3.21
RO 430	5.00	3.04	.53	2.86
RO 419	6.08	2.85	1.33	3.42
TX 14	4.89	2.87	.96	2.91
TX 225	5.64	2.76	.68	3.03
A 1257	6.33	2.63	1.23	3.40
TX 576	-	2.92	.71	1.82 **
TX 523	-	3.67	.36	2.02 **
TX 439	-	3.31	.90	2.11 **
TX 21	-	3.69	.75	2.22 **
TX 552	-	3.50	1.28	2.39

** Average over two locations only

Appendix
Table 11

1989-90 Average Maize Yields
Local Maize Variety Trials
(4 Tests - 3 Locations)
Lesotho

Variety	Machache Ton/Ha Dryland	Maseru Ton/Ha Dryland	Leribe Ton/Ha Dryland	Maseru (late) Ton/Ha Dryland	Yields Ton/Ha
PNR 473	4.03	2.05	2.07	1.94	2.53
PNR 6549	3.31	2.51	1.91	1.11	2.23
PNR 6363	3.17	-	1.48	2.13	2.26***
PNR 394	4.27	2.93	2.50	2.14	2.96
CAR 7530	3.65	2.83	2.04	1.43	2.49
PNR 6434	4.46	2.55	-	-	3.51**
PNR 6528	3.05	1.69	2.34	1.55	2.16
PNR 6334	3.47	2.32	2.13	1.54	2.37
CAR 308	2.24	2.86	1.27	1.46	1.96
CAR 7522	4.37	3.07	2.16	-	3.20***
CAR 7567	4.11	2.25	1.56	-	2.64***
CAR 7555	2.33	2.15	1.92	-	2.13***
CAR 7532	3.46	1.95	2.33	.62	2.89
CAR 7564	1.30	2.83	2.36	-	2.16***
SNK 2232	4.27	2.87	1.54	2.29	2.74
SNK 2147	3.37	1.87	2.31	.65	2.05
SNR 2340	2.54	2.44	-	2.06	2.35***
SNR 2776	4.21	2.87	2.01	.78	2.47
SNR 2244	4.81	2.63	2.01	2.17	2.91
SNR 2338	3.75	3.27	2.43	1.06	2.63
A 210	3.43	-	-	-	3.43*
CAR 7584	3.51	-	-	-	3.51*
CG 4141	2.97	2.39	2.47	-	2.61***
CG 4512	4.18	2.55	-	1.14	2.62**
CG 4410	4.64	3.30	2.33	1.44	2.93
CG 4504	5.02	2.48	1.94	-	3.14***
RO 413	4.42	2.84	1.87	1.94	2.77
RO 419	4.05	3.38	2.82	1.03	2.82
RO 439	2.96	3.20	2.33	1.00	2.37
PNR 6330	-	2.87	-	-	2.87**

Appendix
Table 11 (Cont.)

1989-90 Local Maize Variety Trials

Variety	Machache Ton/Ha	Maseru Ton/Ha	Leribe Ton/Ha	Maseru (late) Ton/Ha	Average Local Yields Ton/Ha
RO 130	2.74	2.56	1.34	1.10	1.94
RO 430	2.44	3.38	-	1.19	2.34***
CAR 7526	3.02	-	-	-	3.02*
A 1616	2.54	-	-	-	3.54*
TX 576	2.56	.89	2.19	1.43	1.76
TX 552	3.82	2.33	1.96	1.06	2.29
TX 14	3.59	2.76	1.24	1.04	2.16
A 293W	2.87	2.50	2.44	2.06	2.47
A 1257W	1.03	2.76	1.83	1.67	1.82
A 1305	3.73	3.24	2.18	1.83	2.75
Silver King	2.55	1.22	1.49	.50	1.44
SSM 2039	4.71	3.27	1.51	1.24	2.68
A 1621W	3.73	-	-	-	3.73*
AX 305W	3.79	-	-	-	3.79*
A 1480	3.85	-	-	-	3.85*
CG 4403	-	2.88	2.12	1.31	2.10***
CG 4502	-	3.21	1.52	1.44	2.06***
R 215	-	2.53	3.21	2.03	2.59***
RO 201	-	2.91	-	2.02	2.46**
CRN 4605	-	-	-	.71	.71*
CRN 4615	-	-	-	1.44	1.44*
CRN 4456	-	-	-	1.08	1.08*

* Tested 1 location
** Tested 2 locations
*** Tested 3 locations
All others tested 4 locations

Appendix
Table 11 (Cont.)

1989-1990 Yield
SARMEIT Maize Variety Trials
2 Tests - 2 Locations
Lesotho

Variety	Maseru Irrigated (Supp.) Ton/Ha	Leribe (dryland) Ton/Ha	Average SARMEIT Yields Ton/Ha	Overall Average Yield Ton/Ha
SNK 2943	4.03	2.06	3.04	-
PNR 473	6.58	3.37	4.98	3.76
PNR 6549	5.89	2.54	4.21	3.22
PNR 6479	3.65	3.50	3.58	-*
CRN 7515	4.06	3.02	3.54	-*
A 293W	5.02	2.35	3.69	33.08
PNR 6363	8.16	3.62	5.89	4.07
CRN 7511	6.66	2.76	4.71	-*
SSM 2039	4.47	2.63	3.55	3.11
AX 305W	4.77	2.91	3.84	3.81
A 471W	6.14	2.30	4.22	-*
A 1257W	6.12	2.88	4.50	3.16
PNR 6463	3.06	3.29	3.18	-*
TX 561	5.54	3.46	4.50	-*
SNK 2147	2.85	2.18	2.52	2.29
RO 413	6.06	1.85	3.96	3.39
SNK 2665	5.17	2.19	3.68	-*
SNK 2669	3.23	2.37	2.80	-*
RO 433	7.09	3.03	3.06	-*
R 201	5.95	2.90	4.43	3.45
CRN 7569	5.80	3.12	4.46	-*
PNR 6467	4.96	2.96	3.83	-*
SC 501	4.10	3.64	3.87	-*
RO 411	5.18	3.59	4.38	-*
SNK 2771	5.32	2.31	3.82	-*
RO 419	6.75	2.10	4.43	3.63
CG 4141	5.94	2.90	4.42	3.51
TX 557	6.08	3.34	4.71	-*
A 1849	7.71	1.96	4.83	-*
CG 4403	5.41	3.72	4.57	3.34
RS 5251	6.14	3.68	4.91	-*
CG 4605	6.28	3.08	4.68	2.70
RS 5205	6.78	3.60	5.19	-*
CRN 7513	7.54	3.05	5.30	-*
A 1621W	4.62	2.27	3.44	3.59
CRN 7581	5.69	2.54	4.11	-*

* New entries; not planted in local trials

Appendix Table 12

Maseru Average Maize Yields (Ton/Ha)
Averaged Over 1986-1990 (4 Years)
ARD - Agronomy Section
Lesotho

Variety	1986-1987 Dry Maseru	1986-87 Dry Maseru	1987-88 Dry Maseru	1987-88 Irri. Maseru	1988-89 Dry Maseru
PNR473	5.42	4.29	1.18	10.58	3.74
A293	2.99	-	1.81	-	-
CAR8522	2.16	3.13	-	10.49	-
CG4141	3.55	3.65	1.00	7.63	4.54
PNR95	4.62	1.70	-	-	-
RO413	5.38	-	1.10	9.04	3.70
PNR6429	5.18	2.45	1.17	9.47	-
PNR6528	4.94	4.02	1.10	13.68	-
RO419	4.84	4.02	1.12	9.17	4.01
SNK2340	4.81	3.03	-	11.83	-
CAR7530	4.79	3.74	-	7.72	-
SNK2338	4.58	4.52	-	-	-
SSM2039	4.45	4.80	1.30	10.62	4.26
SNK2232	4.12	4.09	-	9.91	-
SNK2147	4.11	4.67	1.05	10.58	4.28
SNK2244	3.47	4.00	.96	8.77	-
PNR6549	3.39	4.00	.68	-	3.83
A1305W	2.60	2.08	.41	-	2.82
CG4403	2.54	3.21	0.80	10.97	3.51
A305W	2.34	4.18	1.69	-	3.61
A1257W	2.32	-	1.70	-	4.00
CG4305	2.17	-	-	-	-
TX555	1.87	-	.22	-	-
CG4502	-	5.50	1.48	7.63	2.04
PNR394	-	2.91	-	-	-
TX14	-	4.45	-	7.03	-
RO430	-	4.23	-	10.07	-
CAR308	-	4.53	-	-	-
TX560	-	5.87	-	-	-
PNR6427	-	4.93	-	-	-

Appendix
Table 12 (Cont.)

Maize Average Maize Yields (Ton/Ha)
Averaged Over Years
For Maseru
1986-90

Variety	1986-87 Maseru	1986-87 Maseru	1987-88 Maseru	1987-88 Irr. Maseru	1988-89 Dry Maseru
TX557	-*	-*	1.47	-	3.31
CG4512	-	-	1.67	-	3.82
PNR6330	-	-	-*	4.79	-
SNK2771	-	-	1.44	-	5.25
SILVER KING	-	-	1.42	5.02	-
KDU9051	-	-	.77	-	4.61
CG4410	-	-	.61	-	4.26
A1849	-	-	.40	-	1.82
ZS225	-	-	-	9.96	4.00
CAR7701	-	-	-	-	3.98
RO411	-	-	-	-	4.20
RS5232	-	-	-	-	4.32
CAR7703	-	-	-	-	3.92
SC501	-	-	-	-	4.04
CAR7705	-	-	-	-	3.74
SNK2665	-	-	-	-	4.30
PNR6363	-	-	-	-	2.74
SC5601	-	-	-	-	3.23
A1855W	-	-	-	-	3.41
CAR7707	-	-	-	-	4.41
PNR6463	-	-	-	-	5.04
TX561	-	-	-	-	3.03
CAR7709	-	-	-	-	4.16
SNK2776	-	-	-	-	4.15
ZS233	-	-	-	-	2.13
SA5	-	-	-	-	2.92

* Seed not available - not planted - newer varieties

Appendix
Table 12 (Cont.)

Maseru Average Maize Yields (Ton/Ha)
Averaged Over Years
For Maseru
1986-1990

Variety	1988-89 Sup.Irr.	1989-90 Sup. Irr. SARMETT	1989-90 Dry Local	1989-90 Late Dry Local	Overall	Average Yield: With Sup. Irr. Only	Average Yield: Dryland No Irr.
PNR473	9.10	6.58	2.05	1.94	4.98	8.75	3.10
A293W	5.11	5.02	2.50	2.06	3.25	5.06	2.34
CAR7522	6.26	-	3.07	-	5.02	8.38	2.79
CG4141	5.28	5.94	2.39	-	4.25	6.28	3.03
PNR95	4.91	-	-	-	3.74	4.91	3.16
RO413	5.41	6.06	2.84	1.94	4.43	6.84	2.99
PNR6429	5.48	-	-	-	4.75	7.47	2.93
PNR6528	6.94	-	1.69	1.55	4.85	10.31	2.66
RO419	6.08	6.75	3.38	1.03	4.49	7.33	3.06
SNK2340	4.95	-	2.44	2.06	4.85	8.39	3.09
CAR7530	5.03	-	2.83	1.43	4.26	6.38	3.20
SNK2338	5.42	-	3.27	1.06	3.77	5.42	3.36
SSM2039	4.11	4.47	3.27	1.24	4.28	6.40	3.22
SNK2232	4.55	-	2.87	2.29	4.64	7.23	3.34
SNK2147	3.75	2.85	1.87	.65	3.76	5.72	2.77
SNK2244	4.77	-	2.63	2.17	3.82	6.77	2.65
PNR6549	6.66	6.89	2.51	1.11	3.63	6.78	2.59
A1305W	6.39	-	-	1.83	2.69	6.39	1.95
CG4403	5.26	5.41	2.88	1.31	3.99	7.21	2.37
A305W	-	4.77	3.24	-	3.31	4.77	3.01
CG4305	-	-	-	-	2.17	-	2.17
TX555	-	-	-	-	1.05	-	1.05
CG4502	5.87	-	3.21	1.44	3.88	6.75	2.75
PNR394	5.75	-	2.93	2.14	3.43	5.75	2.66
TX14	4.89	-	2.76	1.04	4.03	5.96	2.75
RO430	5.00	-	3.38	1.19	4.57	7.54	2.93
CAR308	5.15	-	2.86	1.46	3.50	5.15	2.95
TX560	-	-	-	-	5.87	-	5.87
PNR6427	5.59	-	-	-	5.26	5.59	4.93

Appendix Table 12 (Cont.)

Maseru Average Maize Yields (Ton/Ha) Averaged Over Years For Maseru 1986-1990

Variety	1986-1987 Irr.	1989-1990 SARMEIT Irr.	1989-1990 Local Dry	1989-1990 Local Late Dry	1989-1990 Average Yields Overall Dry*	With Irr.
PNR6479	-	3.65	-	-	3.65	3.65
CRN7515	-	4.06	-	-	4.06	4.06
CRN7511	-	6.66	-	-	6.66	6.66
A471W	-	6.14	-	-	6.14	6.14
SNK2669	-	3.23	-	-	3.23	3.23
RO433	-	7.09	-	-	7.09	7.09
R201	-	5.95	-	2.02	3.99	3.99
CRN7569	-	5.80	-	-	5.80	5.80
PNR6467	-	4.96	-	-	4.96	4.96
RS5251	-	6.14	-	-	6.14	6.14
CG4605	-	6.28	-	.71	3.50	3.50
RS5205	-	6.78	-	-	6.78	6.78
CRN7513	-	7.54	-	-	7.54	7.54
A1621W	-	4.62	-	-	4.62	4.62
CRN7581	-	5.69	-	-	5.69	5.69
PRN6434	-	-	2.55	-	2.55	2.55
CAR7567	-	-	2.25	-	2.25	2.25
CAR7555	-	-	2.15	-	2.15	2.15
CAR7532	-	-	1.95	.62	1.28	1.28
CAR7564	-	-	2.83	-	2.83	2.83
RO439	-	-	3.20	1.00	2.10	2.10
RO130	-	-	2.56	1.10	1.83	1.83
TX576	-	-	.89	1.43	1.16	1.16
TX552	-	-	2.33	1.06	1.70	1.70
CRN4615	-	-	-	1.44	1.44	1.44
CRN4456	-	-	-	1.08	1.08	1.08

Appendix
Table 12 (Cont.)

Maseru Average Maize Yields (Ton/Ha)
Averaged Over Years
For Maseru
1986-1990

Variety	1988-89 Irr. Maseru	1989-90 Sup. Irr. SARMEIT	1989-90 Dry Maseru	1989-90 Dry Maseru	1989-90 Average Yields Overall With Irr.		W/O Irr.
TX557	-	6.08	-	-	3.62	6.08	2.39
CG4512	5.49	-	2.55	1.14	2.93	5.49	2.30
PNR6330	5.79	-	2.87	-	4.48	5.29	2.87
SNK2771	-	5.32	-	-	4.00	5.32	3.35
SILVER KING	3.93	-	1.22	.50	2.42	4.48	1.05
KDU9051		-	-		2.69	-	2.69
CG4410	5.62	-	3.30	1.44	3.05	5.62	2.40
A1849	6.38	7.71	-	-	4.08	7.04	1.11
ZS225	4.11	-	-	-	6.02	7.04	4.00
CAR7701	-	-	-	-	3.98	-	3.98
RO411	-	5.18	-	-	4.69	5.18	4.20
RS5232	-	-	-	-	4.32	-	4.32
CAR7703	-	-	-	-	3.92	-	3.92
SC501	-	4.10	-	-	4.07	4.10	4.04
CAR7705	-	-	-	-	3.74	-	3.74
SNK2665	-	-	-	-	4.30	-	4.30
PNR6363	6.44	8.16	-	2.13	4.87	7.30	2.44
SC5601	-	-	-	-	3.23	-	3.23
A1855	-	-	-	-	3.41	-	3.41
CAR7707	-	-	-	-	4.41	-	4.41
PNR6463	-	3.06	-	-	4.05	3.06	5.04
TX561	-	5.54	-	-	4.29	5.54	3.03
CAR7709	-	-	-	-	4.16	-	4.16
SNK2776	4.76	-	2.87	.78	3.12	4.76	2.60
ZS233	-	-	-	-	2.12	-	2.13
SA5	-	-	-	-	2.92	-	2.92
PNR6334	6.01	-	2.32	1.54	3.29	6.01	1.93
SAHARA	3.59	-	-	-	3.59	3.59	-
CG4504	5.30	-	2.48	-	3.89	5.30	2.48
CG4801	6.53	-	-	-	5.64	5.64	-
TX225	5.64	-	-	-	65.64	5.64	-
SNK2943	-	4.03	-	-	4.03	4.03	-

Appendix Table 13

Leribe Average Maize Yields (Ton/Ha)
Averaged Over Years
For Leribe (Dryland only)
1986-1990

Variety	Leribe 1986-87	Leribe 1987-88	Leribe 1987-88	Leribe 1988-89	Local 1989-90	SARMEIT 1989-90	Ave. over years
PNR473	3.92	1.46	.96	3.69	2.07	3.37	2.58
A293W	-	1.98	-	2.62	2.44	2.35	2.35
CAR7522	3.13	-	.54	3.20	2.16	-	2.26
CG4141	3.88	.90	-	2.95	2.47	2.90	2.62
PNR95	2.72	-	-	4.91	-	-	3.82
RO413	-	.72	-	3.42	1.87	1.85	1.97
PNR6429	3.61	1.03	.67	2.37	-	-	1.92
PNR6528	3.86	1.20	.72	2.45	2.34	-	2.11
RO419	3.10	1.67	.96	2.85	2.82	2.10	2.25
SNK2340	3.92	-	.89	2.44	-	-	2.42
CAR7530	2.39	-	.71	2.71	2.04	-	1.96
SNK2338	4.41	-	-	3.40	2.43	-	3.41
SSM2039	4.12	.70	.68	2.88	1.51	2.63	2.09
SNK2232	4.66	-	-	3.69	1.54	-	3.32
SNK2147	3.16	2.81	1.12	1.92	2.31	2.18	2.25
SNK2244	5.11	3.29	-	3.27	2.01	-	3.42
PNR6549	3.44	2.17	.73	3.58	1.91	2.54	2.40
A1305W	2.23	.43	53	2.27	2.18	-	1.53
CG4403	3.66	1.23	1.12	3.79	2.12	3.72	2.61
A305W	2.70	-	-	-	-	-	2.70
A1257W	-	2.26	-	2.63	1.83	2.88	2.40
R201	-	-	-	-	-	2.90	2.90
TX555	-	1.24	-	-	-	-	1.24
CG4502	4.64	1.15	.54	-	1.52	-	1.96
PNR394	3.73	-	-	2.78	2.50	-	3.00
TX14	3.95	-	-	2.87	1.24	-	2.69
RO430	4.09	-	.86	3.04	1.34	-	2.33
CAR308	3.33	-	-	2.97	1.27	-	2.52
TX560	3.95	-	-	-	-	-	3.95
TX560	3.33	-	-	-	-	-	3.95
PNR6427	3.38	-	-	5.59	-	-	4.49

Appendix
Table 14

Machache Average Maize Yields (Ton/Ha)
Average Over Years 1988-1990 (2 Years)
ARD - Agronomy Section
Lesotho

Variety	1988-89 Machache	1989-90 Machache	Average Over Years
PNR6330	1.52	-	1.52*
RO130	-	2.74	2.74*
RO430	.53	2.44	1.49
CAR7526	-	3.02	3.02*
A1616	-	2.54	2.54*
TX576	.71	2.56	1.64
TX552	1.28	3.82	2.55
TX14	.96	3.59	2.28
A293W	.73	2.87	1.80
A1257W	1.23	1.03	1.13
A1305W	.96	3.73	2.35
SILVER KING	.76	2.55	1.66
SSM2039	.99	4.71	2.85
A1621W	-	3.73	3.73*
AX305	-	3.79	3.79*
A1480	-	3.85	3.85*
PNR6429	1.32	-	1.32*
PNR95	.87	-	.87*
PNR6427	.85	-	.85*
ZS225	1.18	-	1.18*
SAHARA	.85	-	.85*
A1849	.28	-	.28*
CG4502	1.45	-	1.45*
CG4801	.06	-	.06*
TX225	.68	-	68*
TX523	.36	-	.36*
TX439	.90	-	.90*
TX21	.75	-	.75*

1988-89 Test planted Nov. 15,1988
1989-90 Test planted Oct. 1, 1989
*One year data not averaged