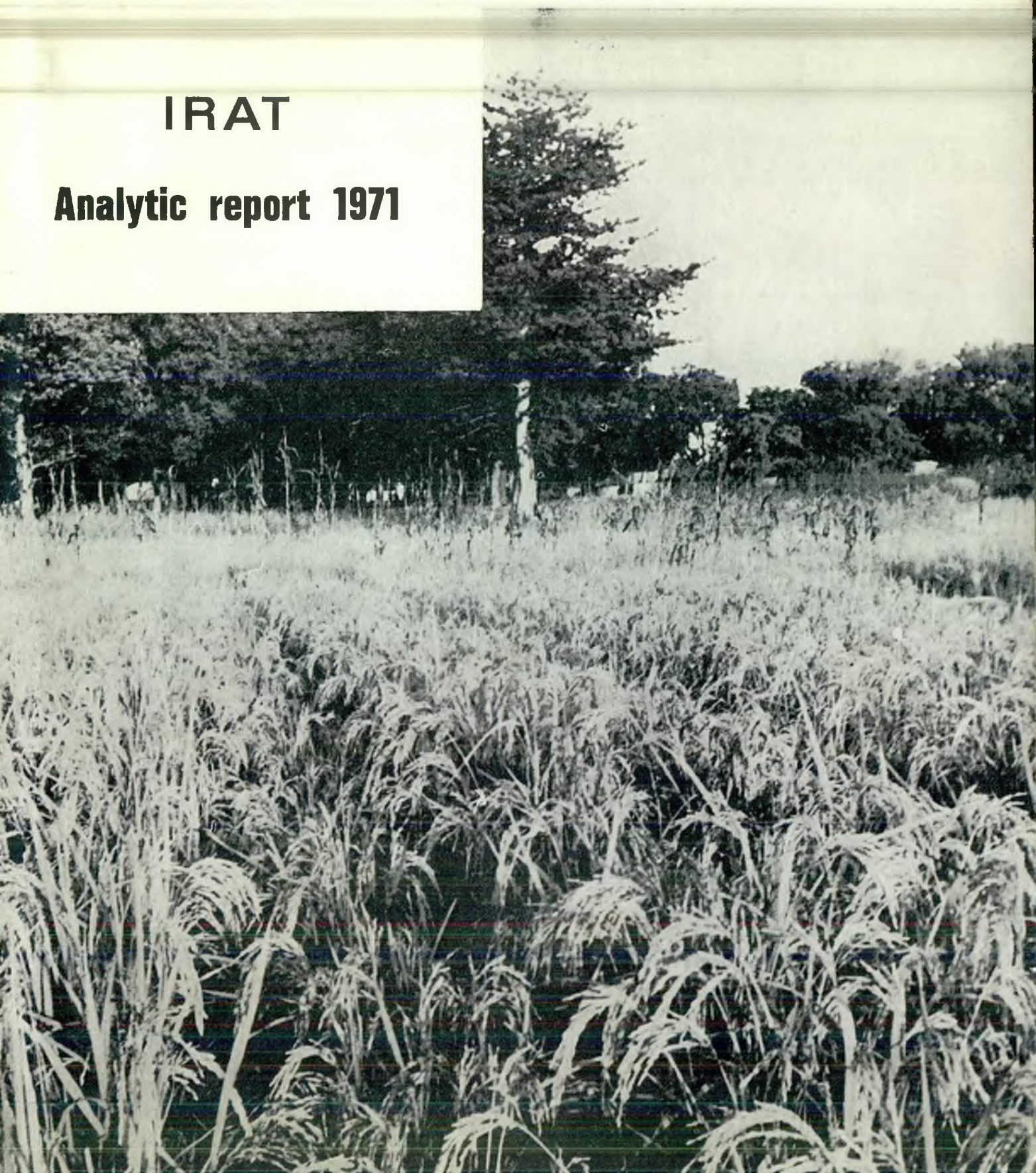
EMPIRE OF ETHIOPIA

MINISTRY OF NATIONAL COMMUNAUTY
DEVELOPMENT AND SOCIAL AFFAIRS

EXPERIMENTAL AND AGRONOMICAL RESEARCH STATION - AWASSA

IRAT

Analytic report 1971



1 - MAIZE

1.1 Breeding and Multiplication

In 1971, four main breeding methods were used :

1/ mass selection,
2/ ear per row selection,
3/ hybrid production,
4/ self pollination.

1.1.1 Mass selection

This selection was carried out with the variety "Jimma mixed origins" which was obtained by mixing the following varieties :

"Jimma Bako", Jimma S68 - S69 (Awassa), Jimma MS 68 Bulk 69 (Awassa). A first mass selection was made in 1970 with a final intensity of selection of 10 % and was followed by a second one in 1971.

In 1971, selection field :

Total area : 15,20 x 35, useful : 8,8 x 20

Spacing : 0,80 x 0,25 - 3 seeds/hole thinned to one

Sowing date : May 11

Fertilization : 100 kg/ha TSP at sowing time
100 kg/ha Urea at thinning

Total isolation : No other maize variety tasseled at the same time within a 50 hectare area

Selection date : November 16

First selection criteria : Vigour, not too high or too late or lodged - well developed cobs not too high, not bare tiped.

Second selection criteria : Ears not too much yellow - Thick cobs - healthy cobs (Specially from fusahium and rots).

Intensity of selection : 25 %

In 1972 this variety "Jimma mixed originins MS 70 - MS 71" shall be multiplied in an isolated field ("irrigation field").

1.1.2 Selection ear per row

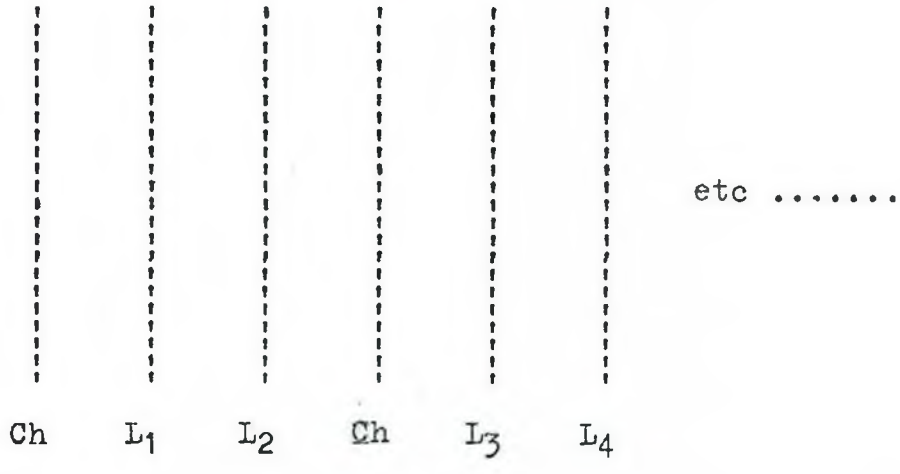
This selection was carried out in 1971 only on the progency of Synth II, already selected by this method in 1969 and 1970.

For this selection, the seeds from a selected cob from the previous cycle are divided into two parts : one part is used to sow one line in the hybridation field from which the selection will be made. The other part is used to sow several plots of progency test trial (half a cob for one line).

A Hybridization field

1 - Each line L corresponds to one cob (half part)

2 - Checks (Ch) are formed by the mixture of all the remaining half part of the cobs.



The rows L are detasseled to force them to be cross pollinated by the rows of the Bulk (Ch lines).

Variety : Synth II MS 68 - E/r 69 - e/r 70

Layout : alternatively 2 rows of detasseled lines, 1 row of bulk for pollination. 100 lines L of 10 cm long

Spacing : 0,80 x 0,25. Two seeds/hole thinned to one.

Seed dressing : Fernasan D

Fertilization : 100 kg/ha of TSP at sowing on April 9
100 kg/ha of urea on May 14

Insecticides : DDT 50 % on April 27

Sowing date : April 9

Dates of detasseling : Starting on July 5, end : August 6

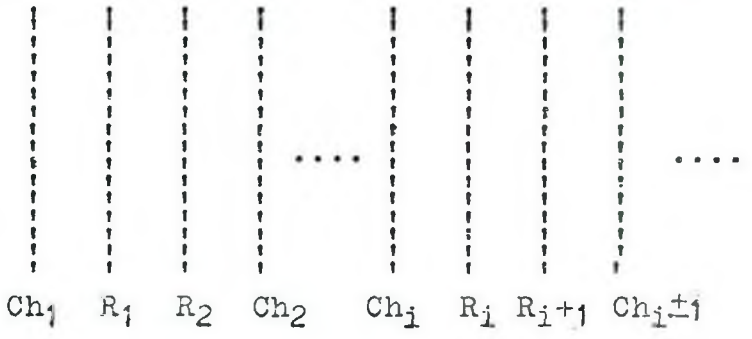
Harvesting date : November 12

Total isolation : No other maize variety tasseled at the same time within 50 hectares radius

B Progency test

A complete block design with 4 replications was used. As with the hybridization field, check lines are sown alternatively with the selected lines, but the plants are not detasseled. To increase the accuracy of yield evaluation, the yield of each row is estimated as a percentage of the check rows, using the formula :

$$\frac{3 \times Ri}{2\ ch_i + Chi+1} \times 100$$



A ranking of the lines was made according to the results of the formula and permitted to choose the 23 best lines out of the hybridization field. In 1972, these lines shall be sown in a Bulk field.

Layout : 100 lines of 8 meters long - 4 replications

Spacing : 0,80 x 0,25

Fertilization : 100 kg/ha TSP at sowing time
100 kg/ha urea at 1st cultivation

Sowing date : April 22 - 23

Tasseling date : August 7

1.1.3 Intervarietal Hybrids production : Test crosses

As part of the national maize policy relative to a cooperative breeding programm, Awassa was requested to perform experimental crosses of Ecuador 573 (known as a good tester) with varieties or composites (see below the full list) chosen as the most interesting material tried in Ethiopia for the last 3 years (see National trials and East african cooperative trials performed previously).

In addition to this programm, Awasa has realised a similar experiment taking Jimma selected at Awasa as the common tester instead of Ecuador 573 (see 113 B)

A Intervarietal crosses with Ec. 573

Hybridization field with two replications and 14 female varieties.

Plot size : 1,6 x 10 - alternatively two female and one male row.

Spacing : 0,80 x 0,25

Fertilization : 100 kg/ha of TSP at sowing
100 kg/ha of urea at 1st cultivation

Sowing dates : The rows of male parents Ec 573 are sown alternatively at D - 4 and D + 4, D being the average sowing date for female parents.

Detasseling : All the female rows were detasseled in order to force them to be feccundated by male rows.

Total isolation : No other maize variety was flowering at the same time in a 50 hectare radius.

List of the varieties :

- Male variety : Ecuador 573
- Female varieties : A x G ; F x G ; (A, G, F, are Kenyan lines , parents of H 632) ; Kawanda composite A ; Ilonga CA ; Zambia composite A ; Ukir full white, Ukir full yellow, Ukiriguru composite B white ; Ukiriguru composite AX ; Ukikiriguru composite B ; Kitale composite C ; Kitale composite E ; Jimma e/r 70.

B Intervarietal cross as with Jimma

Hybridization field with two replications and 10 treatments.

Plot size : 1,6 x 10 - alternatively two female rows and 1 male row.

Spacing : 0,80 x 0,25

Fertilization : 100 kg/ha of TSP at sowing
100 kg/ha of urea at 1st cultivation

Sowing dates : Female lines : May 13
Male lines : May 11 and May 28

Detasseling : All the female rows were detasseled in order to force them to be fecundated by male lines.

Total isolation : No other maize variety was flowering at the same time within a 50 hectares radius.

Harvesting date : November 30

List of the varieties

- Male parent : Jimma MS 68 - e/r - e/r 70
- Female parents : A x G, F x G, Ukiriguru composite B White, Ukiriguru composite full yellow, Kawanda composite A, UK. CA X UK.CBW, Zambia composite A, Ukiriguru composite full white, Kitale composite E MS 70, Ecuador 573.

OBSERVATIONS

Varieties	Diseases and observations	Quality of ears
A x G	Rust important	Medium - good
F x G	Very few rust	Poor - medium
Kawanda composite A	-	Poor
ICA	Too crowded and weak population	Medium
ZCA	Rust very important	Poor
UCA	Very few rust atractive variety	Medium
UCB White	Very few rust atractive variety	Medium
UC full White	Important rust	Medium
UC full yellow	Important rust	Medium
UCA x UCBW	Very few rust atractive variety	Medium - good
Kital C B	Some rust	Medium - Poor
Kital C C	Interesting variety	Medium
Kital C E	Interesting variety	Good - Medium
Jimma e/r 70	-	Medium - Poor

OBSERVATIONS

Varieties	Quality of cobs
A X G	Medium - good
F X G	Good
Uk composite B white	Very good
Uk composite full Y	Medium - good
Kawanda CA	Good - medium
Uk C A X Uk C B W	Good
Zambia C A	Medium - good
Uk composite full W	Medium - good
Kitale composite EMS 70	Medium
Ec 573	Poor

N.B. Jimma X Uk. composite full Y : 30 % seeds are not yellow but white, that means some doubts about the quality of female parents seeds. Same observation for intervarietal crosses with Ec 573.

All intervarietal hybrids produced in these two above tests, will be tried in a "Prenational Yield Trial" in 1972 at main experiment stations in Ethiopia.

1.1.4 Jimma Bulking and inbreeding

As a following of the ear from selection carried out in 1969 and 1970, on Jimma variety, we performed in 1971 a bulking of the main selected entries (Jimma MS 68 e/r 1969 - e/r 1970).

Size of the plot : 500 m^2

In addition, 90 plants were chosen, mainly for their vigor and their low sensitivity to helminthosporium and imbreeding was performed. These plants were collected separatly and new selfing will be performed in 1972.

As for the bulk itself, it will be used as a basic stock of seeds and multiplied in 1972 to be delivered for seed production.

1.1.5 Bulking

Similarly to the Jimma, a bulking has been performed on the 511 most avanced selection (511 MS 68 - e/r 69 - e/r 70).

These basic seeds will be increased in 1972 before delivery for seed production.

1.1.6 Seed production and multiplications

- Increases of 511 : MS 68 - B 69
  Synth II : e/r 69
  Jimma : mixing of jamma S 70 and Jimma MS 68 - B 69
  EC 573

- Increases of H 632 component lines :
  A line
  F line
  G line
  A x G

- Hybridization field : Awassa H 611 production
  EC 573 x Synth II e/r 69 - B 70

1.1.7 Conclusion on breeding and multiplication

- 1971 closed the ear per row selection under taken in 1969 on 3 open pollinated varieties or intervarietal hybrids (sunthetic II - H 511 and Jimma). A third year of ear per row selection was only performed on Synthetic II, which will be bulked in 1972. 511 and Jimma were bulked in 1971.

- From these bulks, increases will be performed and will be given to the seed production department of Awasa farm.

- The benefit of this ear from selection will have to be observed, not on the yield itself but on characters which have a high heritability like disease resistance (see criteria of selection).

On the other hand, we have started in 1971 a new phase in the breeding program with the imbreeding of Jimma selected. This work must be followed up in order to perform, lates on, successful crossing of selected lines with a good tester.

Another program of hybridization has been widely started in 1971, within a cooperative program, through a systematical crossing of main entries with Jimma selection an with Ecuador 573.

1.2 Variety and Yield Trials

1.2.1 East African Variety trial

A Purpose - This variety trial was carried out in different location in Africa under the leadership of the "East African Agriculture and forestry Research Organization" from Kenya. Particularly, in Ethiopia, 11 stations were making this trial. As a general point of view, the purpose was to know the compartment of different varieties according to the climate, the latitude and the altitude. On the other hand, our local interest was to know the performances and the adaptability of Kenyan varieties , and few other entries in the area of Awassa.

B Methods

Lay out : Randomized complete blocks design with 4 replications and 15 varieties.

Plot size : 4 rows of 2,4 m long - 2 rows useful
Total area - 3 x 2,4 = 7,2 m^2
Useful area - 1,50 x 2,4 = 3,6 m^2
Spacing - 0,75 x 0,30
Fertilization : 100 kg/ha Triple Superphosphate at sowing time
100 kg/ha Urea at 1st cultivation (June 2)

Sowing date : 14 April

C Field observations

C Field observations

Treatments	Cycle (1)	Stand count (2)	Lodging (3)	Heignt of cob (4)	Height of plant (5)	Blight (6)	Rust (7)	Yield (8)
H 611 C	103	15,0	8,2	210	384	1,12	1,00	90,3
H 613 B	102	15,2	8,5	190	348	1,12	1,25	81,1
H 632	104	15,5	4,7	169	325	1,12	1,50	84,8
H 511	90	15,7	6,0	150	305	1,37	2,12	81,2
H 512	90	16,5	6,7	144	304	1,25	2,12	68,5
UCA4 XUCB/W C1	98	15,7	6,5	165	342	1,00	1,62	74,3
ICAXICB/Fulb W	96	16,5	3,5	158	306	1,75	3,75	54,8
UCAC3	103	15,7	9,2	193	357	1,37	1,75	83,8
UCB/WC1	100	15,7	3	168	322	1,37	2,25	78,5
Ilonge CA	95	15,7	4,2	164	313	1,62	4,00	56,2
Kawanda CA	98	17,0	8,2	173	330	1,25	1,87	73,5
SV 28	100	16,5	4,5	150	299	2,12	4,37	48,1
SR 52	94	15,7	6,2	149	314	1,15	2,50	77,7
Jimma Bako	98	16,5	4,2	164	321	1,75	2,62	58,4
Jimma X Sunth II	102	15,7	6,2	189	358	1,12	1,87	74,7
Mean								72,3
LSD 0,05								13,6
CV%								13

Number of days between sowing and 50 % tasseling
Number of plants in a useful plot. Average of the 4 Replications
Number of lodged plants per plot. Average of the 4 Replications
Height of cobs. Average
Height of plants. Average
Blight scale of 0.0 to 5.0 when 0.0 has no rust and 5.0 is an extremly severe infection
Rust - Score is the same manner as for rust
Adjusted yields after statistical analysis.

E CONCLUSION

If we compare the results obtained at Awasa for the different varieties in 1971 and previously, we may point out :

1 SR 52, our top yielding variety before 1971, shows a low performance in 1971 : The increasing importance of diseases (mainly rust) may explain the decrease of the yield of this variety at Awasa.

2 H 611, H 511, H 632 are still among the top varieties and justify the interest given to their extension in the area through seed multiplication. We may point out the great interest of H 611 for its low sensitivity to diseases.

3 UCA, UCB and their cross confirm their good performance.

1.2.2. Short cycle variety trial

A - Purpose

This trial was carried out in order to compare some short cycle varieties from INRA and IRAM with our short cycle variety H 511.

B - Methods

Lay out : Balanced incomplete blocks design with 4 Replications and 5 Varieties.

Plot size : 4 rows of 2 meters long - 2 useful rows
Total area - 2,4 x 2 = 4,8 m2
Useful area - 1,2 x 2 = 2,4 m2

Spacing : 60 cm between rows - 20 cm on the row

Fertilization : 100 kg/ha triple superphosphate at sowing time, 100 kg/ha urea at 1st cultivation (June 2)

Insecticides : Cut worms : DDT 50 %
Army worms : Malathion on June 2.

Sowing date : 21 April - germination May 10
Animal damages obliged to a resowing on May 19 for some rows.

C - FIELD OBSERVATIONS

Observ. Varieties	Cycle (1)	Harvest date	Stand count (3)	Lodging (4)	Height of plant (5)	Height of cobs (6)	Blight (7)	Rust (8)
INRA 300	59	16/9	17	00.0	174	043	3.1	3.0
HD2	83	21/10	18	00.0	285	125	1.4	2.1
HD9	81	21/10	17	00.0	279	117	1.0	2.2
HD 322	85	21/10	18	00.0	276	119	1.1	2.9
H 511	52	21/10	18	15.3	298	142	1.1	2.0

I - Number of days between sowing and flowering 50 %.
3 - Number of plants in a useful plot.
4 - Lodging as percentage.
5 - 6 - Average height, centimetre
7 - 8 - Score from 1 to 5 ; 0.0 : No disease, 5.0 extremely severe infection.

D - Statistical Analysis Results

- Analysis of Variance

The effect of treatments is significant :
F calculated : 78.83, F 5 % tables : 4.53
General average : 280.70 dag/2,4 m2
Coefficient variation : 6,4 %

- DUNCAN test permits to rank thevarieties as follow :

Varietes/Results	Average yield dag/ 2.4 m^2		Test
	Observed	Adjusted	
HD 322	353,25	368,90	a
HD 2	337.00	344.30	a
HD 9	318,00	303,50	b
H 511	273,00	276,50	b
INRA 300	122,25	110,30	c

(varieties which have a common letter do not significantly differ).

E - CONCLUSIONS

Like in 1971, the Malagasy varieties confirm that they might be interesting because of their short cycle and their short height.. Besides, the absence of lodging may confirm that the population per hectare could be increased in order to have possibly better yields.

1.2.3. 511 and Jimma selected yield trial

A - Purpose

The purpose of this trial is to compare the performances of two varieties at several levels of selection and to evaluate the heterosis of the hybrid Jimma X 511.

B - Methodology

Lay out : Latin square design with 6 treatments.

Plot size : 7 rows of 5 meters long - 5 rows useful

Total area : 5,6 x 5 = 28 m2

Useful area : 4 x 5 = 20 m2

Spacing : 80 cm between rows - 25 cm on the row.

Fertilization : 100 kg/ha triple superphosphate at sowing time
100 kg/ha urea at 1st cultivation May 17

Seed dressing : Fermasan D

Sowing date : April 15

Harvesting date : November 9

C - Field observations

(table next page)

Observations / Varieties	Cycle (1)	Stand count (2)	Lodging % (3)	total height (4)	Height of cobs (5)	Blight (6)	Rust (7)
H 511 Original	81	94,0	11,5	3,16	1,74	1,7	2,0
H 511 S70	86	96,0	17,0	3,40	1,94	1,5	1,8
Jimma S70	95	94,8	13,5	3,57	2,14	1,8	2,2
Jimma S68	94	97,3	11,3	3,53	2,08	2,2	1,7
Jimma e/r 69-B70	93	97,3	08,7	3,52	1,98	2,2	1,8
Jimma X 511	85	97,1	10,8	3,34	1,84	2,0	1,8

1 - Number of days between sowing and flowering 50 % - Average of 6 plots.
2 - Number of plants in a useful plot - Average of the 6 plots of one variety
3 - Lodging as percentage.
4 - Height of plants in a useful plot - Average of 6 plots.
5 - Height of cob in a useful plot - Average of 6 plots.
6 - Blight : Score from 1 to 5 - cf. previous trial.
7 - Rust : Score from 1 to 5 - cf. previous trial.

D - Statistical Analysis

- Analysis of Variance
  It shows that this final is significant at 5 % level.

- F calculated for treatments : 3,93 (F of table 2,71).

- General Average : 79,059 q/ha

- Coefficient Variation : 9,004 %

- M.S.D. : 2.906 q/ha

DUNCAN TEST

Results Varieties	Yield q/ha	Test
Jimma X 511	84.950	a
H 511 Original	83.891	a
H 511 S70	83.500	a b
Jimma e/r 69-B70	76.066	a b c
Jimma S68	74.566	b c
Jimma S70	71.383	c

E CONCLUSIONS

Though it has the first rank, the hybrid Jimma X 511 does not differ from 511. But it is interesting to note that 511 keeps a short cycle in the hybrid combination.

We may point out the interest to perform later on improved selections of Jimma a single crosswith 511 selections which will give us a short size hybrid, with a similar cycle than H 511 and a yield equal or possibly higher.

1.2.4. Synth II selected yield trial

A -Purpose

The same purpose as the previous trial, synthetic II variety beeing the tried variety instead of Jimma and 511.

B Methodology

Lay out : Latin square design with 6 treatments

Plot size : 7 rows of meters long - 5 useful rows
Total area : 5,6 x 5 = 28 m2
Useful area : 4,0 x 5 = 20 m2

Spacing : 80 cm between rows - 25 on the row

Fertilization : 100 kg/ha triple superphosphate at sowing time
100 kg/ha urea at 1st cultivation June 4.

Seed dressing : Fernasan D

Sowing date : April 22

Harvest : November 18.

C - FIELD OBSERVATIONS

Observations / Varieties	Cycle (1)	Stand count (2)	Lodging % (3)	Height of plants (4)	Height of cobs (5)	Rust (6)	Blight (7)
H511 original	88	91,7	10,0	310	157	2.2	1.7
H 632	--	97,3	02,6	343	193	2.2	1.0
Synth II 68 sh	100	87,8	10,6	372	217	2.0	1.5
Synth II S 70	"	86,5	12,1	365	214	1,8	1,3
Synth II e/r 69-B70	"	86,3	12,1	363	209	1,7	1.0
Synth II X Jimma	"	86,0	14,9	367	205	2.2	1.3

1 - Number of days between sowing and flowering 50 %
2 - Number of plants
3 - Lodging as a percentage
4 - Height of plants (centimeters)
5 - Height of cobs (centimeters)
6 - Rust - Score from 1 to 5 (cf. previous trial)
7 - Blight - Score from 1 to 5 (cf. previous trial)

D - Statistical analysis

- Analysis of variance
  It shows that this trial is significant at 5 % level.

- F calculated for treatments 13,02 (F tables 2,71)
  General average q/ha 82,516
  Variation coefficient % 8,371
  M.S.D. q/ha 2,820

- TEST OF DUNCAN

Treatments / Results	yield q/ha	Test
H 632	99.900	a
H511 (original)	88.008	b
Synth II X Jimma	81.833	b c
Syn.II 68SH	78.833	c
SynII S70	73.524	c
Syn.II e/r69-B70	72.999	c

E CONCLUSIONS

It seems that the hybrid Synth II x Jimma is not so interesting compared with H 511 or with its parent materials : more lodged plants, and no significant increase of yield.

1.2.5 Mixed varieties trial

A Purpose

This trial was carried out in order to compare two hybrids from Awassa with their parents and to evaluate the results of these hybrids in relation with the yield of H 632.

B Methodology

Lay out : Randomized complete blocks design with 7 replications and 7 entries

Plot size : 7 rows of 8 meters long - 5 useful rows
Total area : 5,6 x 8 = 44,8 m2
Useful area : 4,0 x 8 = 32,0 m2

Spacing : 0,80 x 0,25 - 2 seeds/Hole thinned to one

Fertilization : 100 kg/ha triple superphosphate at sowing time
100 kg/ha Urea at 1st cultivation

Sowing date : 28 April

Harvest : November 4

C Field observations

Observ. / Varieties	Height of plants (cm)	Height of cobs (cm)
Jimma S70	319	182 V
H511 S70	297	149
Synth II S70	335	174
Jimma X 511	310	168
Jimma X Synth II	328	178
H 632	321	184 V
Local Maize	314	175

D Statistical Analysis

- Analysis of variance :

It shows that this trial is significant at 5 % level :
F calculated for treatments 11,15 (F calculated 2,36)
General average q/ha : 72.308
Coefficient of variation % : 10.525
M.S.D. q/ha : 2.876

- DUNCAN test

Variations \ Results	yield q/ha	Test
H 632	90.571	a
Jimma X H 511	75.531	b
Jimma X Synth II	74.312	b c
H 511 S70	70.455	b c
Jimma S70	69.138	b c
Synth II S70	66.375	c d
Local Maize	59.772	d

E CONCLUSIONS

H 632 stands definitively higher than the 2 other open pollinated varieties and the 2 Awassa hybrids. These two hybrids Jimma x 511 and Jimma x Synth II get a good rank but do not differ significantly from their parents.

1.2.6 Maize regional uniform variety trial

A Purpose

This trial was carried out in order to know the well adapted varieties in the area of the Awassa Development projet.

B Methodology

Locations : Neghelle Arussi 47 km. North of Awassa.
Dembere Kella 40 km South of Awassa
Sinklle 74 km West of Awassa

Lay out : Complete randomized blocks design with 7 replications and 4 treatments

Plot size : 10 rows of 5 meters - 8 useful rows

Plot size : 10 rows of 5 meters - 8 useful rows
Total area : 8 x 5 = 40 m2
Useful area : 6,4 x 5 = 32 m2

Spacing : 80 cm between rows and 25 cm between plants on the row - 2 seeds/hole thinned to one.

Fertilizers : 100 kg/ha triple super phosphate at sowing
100 kg/ha Urea at thinning time

Treatments : 1/ H 511 S 70
2/ Synth II S 70
3/ Jimma S 70
4/ H 632

C Statistical Analysis - Results

Analysis Titles \ Locations	Neghelle Arussie	Dembere Kella	Sinklle
Blocks effect F calculated	2.327	5.028	4.621
F 5% Tables	2.66	2.66	2.66
Treatments effect F calculated	16.078	25.755	22.136
F 5% Tables	3.16	3.16	3.16
General average q/ha	51.044	45.883	21.786
Variation coefficient %	10.869	11.333	19.848
M S D q/ha	2.097	1.965	1.634

DUNCAN test

Neghelle Arussie			Dembere Kella			Sinklle		
Treatments	Yield q/ha	Test	Treatments	Yield q/ha	Test	Treatments	Yield q/ha	Test
H 632	63.638	a	H 632	60.214	a	H 632	33.312	a
Synth II S70	47.495	b	Synth II S70	44.946	b	Synth II S70	18.303	b
H 511 S70	46.589	b	H 511 S70	40.325	bc	Jimma S70	17.991	b
Jimma S70	46.455	b	Jimma	38.049	c	H 511 S70	17.540	b

Varieties having a letter in common do not significantly differ.

As we can see, H 632 is ahead at every place. It is followed by Synthetic II, H 511, S70 and Jimma which do not significantly differ except for Synthetic II at Dembere Kella.

1.2.7. Trial on seeds produced at Awassa

A Purpose

The purpose of this trial is to compare the seeds harvested at different units of production at Awasa farm, as far as synthetic II is concerned. SR 52 has been added as a check.

B Methodology

Lay out : Latin square design with 6 varieties

Plot size : 7 rows of 5 meters long, 5 useful rows
Total area : 5,6 x 5 = 28 m^2
Useful area: 4,0 x 5 = 20 m^2

Spacing : 0,80 x 0,25 - 2 seeds/hole thinned to one.

Fertilization : 100 kg/ha triple superphosphate at sowing time
100 kg/ha urea at 1st cultivation

Entries : Synth II (unit 1A), Synth II (unit 1B), Synth II (unit 2), Synth II (unit 3), Synth II (unit 4), SR 52.

C Statistical analysis

F calculated for the treatments 33,8 (F of tables 2,71)
General average : q/ha 66.847
Coefficient of variation : % 8.503
E.T.M. (q/ha) 2.320

Duncan test

varieties results	Yield q/ha	Test
SR 52	93.658	a
Synth II 3	64.508	b
Synth II 4	64.349	b
Synth II 2	62.808	b c
Synth II 1 B	59.174	b c
Synth II 1 A	56.583	c

D Conclusions

As we can see SR 52 gives yields which are 50 % higher than the average yield of the synthetic II variety.

The yield of all sources of synthetic II rank similarly except for the seeds produced at unit IA.

We may point out that this trial was performed at Awasa HQ. The climate and the soil of which look like more to those of units 2, 3 and 4 than those of units 1 A and 1 B.

1.3 Cultural practice trials

1.3.1 Spacing trial on H632

Lay out : Complete randomized blocks design with 8 replications and 4 treatments.

Plot size : 5 rows of 9 meters - 3 useful rows
Total area : 4 x 9 = 36 m2
Useful area : 2,4 x 9 = 21,6 m2

Treatments : Spacing - 1 - 0,80 x 0,50
2 - 0,80 x 0,30
3 - 0,80 x 0,25
4 - 0,80 x 0,20

Fertilization : 100 kg/ha TSP at sowing time
100 kg/ha urea at 1st cultivation May 13

Sowing date : April 9

Harvest : October 25

B Field observations

Treatments (Spacing)	Cycle (1)	Theorical Pop/ha (2)	Standing Plants (3)	Real Pop/ha (4)	Lodging % (5)
0.80 x 0.50	92	25.000	62.0	28.700	05.0
0.80 x 0.30	-	41.670	93.6	42.880	10.1
0.80 x 0.25	-	50.000	103.5	47.920	17.1
0.80 x 0.20	-	62.500	132.9	61.510	26.7

1 - Number of days between sowing and flowering 50 %.
2 - Theoretical population per hectare.
3 - % of standing plants per useful plot.
4 - Actual population per hectare (calculated from data 3).
5 - Lodging as a percentage.

C STATISTICAL ANALYSIS RESULTS

- Analysis of Variance

Source of variation	Sum of Squares	Degrees of Freedom	Variance	F calculated	F 5% Tables
Total	1521673	31			
Residual	738822.00	21	35181.952		
Blocks	373310	7	53330.000	1.515	2.49
Treatments	409542	3	136514.00	3.880	3.07

General average : 94.752 q/ha

Coefficient variation : 9.164 %

E.T.M. : 3.070 q/ha

Duncan test

Treatments	Yield-q/ha	Test
0.80 x 0.30	100.185	a
0.80 x 0.25	99.733	a
0.80 x 0.20	90.312	b
0.80 x 0.50	88.778	b

D Conclusions

The top yield is obtained for two spacing : 80 x 30 and 80 x 25. But, because of the lodging dates and the economic motives, it is better to use the spacing 80 x 30 that means a population of 42,000 plants/hectare.

Lodging is increasing with the density of population. It should have been interesting to know the average height of the plants according to the treatments in order to determine if the plants are taller when the population is more numerous.

1.3.2 Spacing trial on H 511

A Methodology

Lay out : Complete randomized blocks design with 8 Replications and 4 treatments.

Plot size : 5 rows of 9 meters - 3 useful rows
Total area : 4 x 9 = 36m2
Useful area : 2,4 x 9 = 21,6m2

Treatments : Spacing : 1 - 0.80 x 0.40
2 - 0.80 x 0.25
3 - 0.80 x 0.20
4 - 0.80 x 0.16

Fertilization : 100 kg/ha TSP at sowing time April 17
100 kg/ha Urea at 1st cultivation May 18

Sowing date : April 17

Harvest : October 22

B Field observations

Treatments Spacing	Cycle (1)	Theorical Pop/ha (2)	Standing plants (3)	Real Pop/ha (4)	Lodging % (5)
0.80 x 0.40	79	31.200	64.2	29.760	08.9
0.80 x 0.25	-	50.000	108.0	50.000	13.6
0.80 x 0.20	-	62.500	117.4	54.340	16.6
0.80 x 0.16	-	78.100	146.1	67.650	35.5

1 - Number of days between sowing and flowering 50 %

2 - Theoretical pop/ha extrapolation of spacing treatments

3 - Number of plants in a useful plot

4 - Real population per hectare extrapolation of (3)

5 - Lodging as a percentage.

C Statistical analysis results

- Analysis of variance

Source of variation	Sum of Squares	Degrees of Freedom	Variance	F calculated	F 5% Tables
Total	1706671	31			
Residual	644489.00	21	0689.952		
Blocks	629625	7	89946.429	2.930	2.49
Treatments	432557	3	144185.667	4.698	3.07

General Average - 86.304 q/ha
Variation coefficient - 9.397 %
- 2.867 q/ha

DUNCAN TEST

Treatments	Yield q/ha	Test
0.80 x 0.25	91.967	a
0.80 x 0.20	89.670	a
0.80 x 0.40	85.775	a b
0.80 x 0.16	77.806	b

CONCLUSIONS.- the same observations can be made out of the results like on the precious trial on H 632
- the best population for planting is around 50.000 plants/ha.

1.3.3 Maize regional uniform sowing date trial

A Purpose

This trial was carried out in order to determine the optimum sowing dates of one long cycle variety (H 632) and one short cycle variety (H 511). The experiment was conducted in three places of the area of the Awassa Development project.

B Methodology

Locations : Neghelle Arussie 47 km North of Awassa
Dembere Kella 40 km South of Awassa
Sinklle 74 km West of Awassa

Lay out : Split plot 2 x 3 design with 5 replications
Main treatment : Variety ;
Second treatment : Sowing dates

Plot size : (Second treatment)
7 rows of 6 meters - 5 useful rows
Total area : 5.6 x 6 = 33.6 m2
Useful area : 4.0 x 6 = 24.0 m2

Spacing : 80 cm between rows - 25 cm on the row

Fertilizers : 100 kg/ha Triple Superphosphate at sowing
100 kg/ha Urea at thinning

Varieties : H 632 - H 511

Sowing dates.

Locations / Treatments	Neghelle	Dembere Kella	Sinklle
1	April 27	April 23	April 27
2	May 12	May 8	May 12
3	May 27	May 23	May 27

C Statistical analysis - Results

Analysis Titles / Locations	Neghelle	Dembere Kella	Sinkelle
Block effet F calculated F 5% Tables	0.840 6.39	1.630 6.39	-
Main treatment F calculated F 5% Tables	7.824 7.71	30.815 7.71	-
M.S.D. Q/Ha (Main treatment)	2.949	2.393	-
Second treatment F calculated Sowing dates F 5% Tables	15.946 3.63	8.802 3.63	-
Interaction F calculated (varieties X sowing dates) F 5%	4.891 3.63	1.062 3.63	-
M.S.D. Q/ha (second treatment)	1.959	2.373	-
General average Q/ha	58.831	41.390	13.144
Standard deviation Q/ha	6.197	7.504	5.756
Variation coefficient %	10.534	18.130	43.792 Prohibitive

We will not take into consideration the too heterogenous results of Sintelle (coefficient of variation too high)

In both remaining situations (Neghelle and Dembere Kella), the trial is significant for the saving date effect and the varieties. In addition, the interaction variety x sowing date is significant at Neghelle.

The Duncan test gives the following results :

1) at Neghelle

H 632			H 511		
Sowing date	Yield Q/ha	Test	Sowing date	Yield Q/ha	Test
April 27	76.150	a	May 12	58.358	a
May 12	60.958	b	April 27	56.275	a
May 27	56.891	b	May 27	44.358	b

2) at Dembere kella

Varieties Yield / Sowing dates	H 632 Yield q/ha	H 511 Yield q/ha	TEST
May 8	58.175	34.441	a
April 23	53.383	35.191	a
May 23	40.300	26.350	b

D Conclusion

1/ As a general rule, we found (for maize and other crops as well) that the variation coefficients of trials were generally high in the different mentioned regional locations. This must be explained by the fact that those experiment fields were recently used as places for carrying trials.

2/ Sowing dates of end of April are preferable to those of end of May, as a general rule. They are preferable even to sowing dates taking place at the beginning of May for H 632 at Nagelli (or for both varieties at Dembere Kella) between sowing dates done at the end of April or at the beginning of May.

These above result coincide with those generally observed at Awasa (see previous reports for 1968-69-70).

We may also point out the already found interaction variety x sowing date which encourage to sow earlier H 632 than H 511. However, we did not observe H 511 yielding more than H 632 for late sowing, like you did with H 511 regard less to H 613 B in 1969 (see report p. 36).

1.4 Fertilizer trials

1.4.1 Splitted fertilizer trial

A Methods

Locations : Headquarter and Shallo

Lay out : Split plot design with 6 Replications
Main treatment : 2 varieties H 632 and Jimma
Second treatment : N Fertilization.

Plot size : Elementary : 5 rows of 7.5 m - 3 useful rows
Total area : 4.0 x 7.5 = 30 m2
Useful area : 2.4 x 7.5 = 18 m2

Spacing : 0.80 x 0.28 H 632
0.80 x 0.24 Jimma

Sowing dates : HQ. April 12
Shallo April 13

Tasseling date : HQ. only - H 632 : 13 July
Jimma : 75 July

Fertilization : On all the plots 300 kg/ha of triple superphosphate
N Treatments
A No Urea
B 110 kg/ha Urea at 1st cultivation May 13 (50 Units of N)
C 220 kg/ha Urea at 1st cultivation May 13

Fertilization : On all the plots 300 kg/ha of triple superphosphate

N Treatments

A Nc Urea

B 110 kg/ha Urea at 1st cultivation May 13 (50 units of N)

C 220 kg/ha Urea at 1st cultivation May 13 (100 units of N)

D 110 kg/ha Urea half at sowing
Half at 1st cultivation (thinning time)

E 220 kg/ha Urea half at sowing
Half at 1st cultivation.

B STATISTICAL ANALYSIS - RESULTS - (HEAD QUARTER)

1/ Analysis of variance

Source of variation	F calculated	F 5% Tables
Blocks	0.891	5.05
Main treatment (varieties)	122.614	6.61
Second treatment (Fertilization)	6.458	2.61
Interaction (varieties X Fertilization)	0.997	2.61

General average : 64.8 q/ha
Standard deviation : 10.7 q/ha
Variation coefficient : 16.5 %
M.S.D. (Mean treatment) : 1.56 q/ha
M.S.D. (Second treatment) : 3.09 q/ha

2/ Orthogonal decomposition

	F calculated	F 5% Tables
Doses effect	2.645	4.08
Total fertilization at once versus splitted	0.221	"
Interaction doses X ways of fertilization	3.485	"
Check plot (no Urea) versus fertilized plots	19.480	"

3/ DUNNET TEST

Treatments	Yield q/ha H 632	Yield q/ha Jimma
220 kg/ha Urea half at sowing half at thinning	85.268 a	62.935 a
110 kg/ha Urea brought all at thinning	83.962 a	51.240 a
220 kg/ha Urea brought all at thinning	74.962 a	58.750 a
110 kg/ha Urea half at sowing half at thinning	74.916 a	51.629 a
No Urea	66.564 b	38.759 b

C CONCLUSIONS : for the HQ Trial

There is a significant effect of the two varieties and there is also a significant effect of the fertilization, but no interaction.

Besides, no difference is significantly observed between either the dosies of urea applied (110 kg or 220 kg/ha), either the ways of application (half at sowing - half at the thinning time or the whose doses applied at the thinning time).

D STATISTICAL ANALYSIS AND RESULTS (FOR SHALLS TRIALS)

1/ Analysis of variance

Source of variation	F calculated	F 5% Tables
Blocks	0.352	5.05
Main treatment (varieties)	87.800	6.61
Second treatment (fertilization)	8.774	2.61
Interaction varieties x fertilization	0.934	2.61

General average	:	83.7 q/ha
Standard deviation	:	10.1 q/ha
Variation coefficient	:	12.0 %
M.S.D. (Main treatment)	:	1.7 q/ha
M.S.D. (Second treatment)	:	2.9 q/ha

2/ Orthogonal decomposition

	F calculated	F 5% Tables
Doses effect	2.135	4.08
Total fertilization at once versus splitted	0.440	"
Interaction doses x way of fertilization	0.637	"
Check plot (no Urea) versus fertilized plots	1.885	"

3/ DUNNET test

Treatments	Yield q/ha	Yield q/ha
220 kg/ha Urea brought all at thinning	101.750 a	77.657 a
220 kg/ha Urea half at sowing half at thinning	96.907 a	81.712 a
110 kg/ha Urea half at sowing half at thinning	98.074 a	76.685 a
110 kg/ha Urea brought all at thinning	97.842 a	68.398 a
No Urea	82.842 b	55.129 b

E CONCLUSION

Conclusions that can be taken out from Shallo experiment are similar to those mentionned for the previous HQ trial.

1.4.2 First year of residual effect of a phosphate application (Head Quarter)

A Purpose : This trial was carried out at HQ 8 in order to evaluate the residual effect of a P fertilization applied in 1970 (see report on this trial in Awasa 1970 P. 31) It was established on the same lay - out as the P response trial done in 1970, but without any application of P in 1971.

B Methods

Lay out : Split plot design with 6 Replications
Main treatment : 2 varieties : H 632 and Jimma
Second treatment : Residual effect of a P fertilization applied in 1970.

Plot size : Secondary plot : 5 rows of 7.5 meters
3 useful rows
Total area : 4.0 x 7.5 = 30 m2
Useful area : 2.4 x 7.5 = 18 m2

Spacing : 0.80 x 0.28 H 632
0.80 x 0.24 Jimma

Fertilization : On the whole experiment : 100 kg/ha urea
Nothing else in 1971

Treatments : P fertilization in 1970, that is to say ;

a/ No P_2O_5
b/ 50 kg P_2O_5/ha
c/100 kg -
d/300 kg -
e/500 kg -

Sowing date : April 10 - Harvest October 27

C Observations in the field

May 17 : visual strong differences, according to the P rates

Tasseling : Around July 10 for Jimma (cycle 91 days) but some differences according to the treatments.
Around July 14 for H 632 (cycle 95 days) ; also some differences.

D Statistical analysis and results

1/ Analysis of variance

Source of variation	F calculated	F 5% Tables
Blocks	0.666	5.05
Main treatment (varieties)	57.786	6.61
Second treatment (P reponse)	28.644	2.62
Interaction (varieties x fertilization)	1.495	2.62

General average : 67.694 q/ha
Standard deviation : 9.24 q/ha
Variation coefficient : 13.6 %
M.S.D. (Main treatment) : 2.308 q/ha
M.S.D. (Second treatment) : 2.668 q/ha

2/ Polynomial coefficients and response curve

coefficients	F calculated	F 5 % Table	
linear	70.137	4.09	s
quadratic	41.254	4.09	s
cubic	2.951	4.09	n.s.

Equation of the response curve

$Y = 0.392\ x^2 + 0.218\ x + 49.332$

max.Y = 85.689 for x = 332.191

Treatments	Average yields	
	observed	Adjusted
P 0	47.287	49.332
P 50	59.708	59.453
P 100	71.402	67.926
P 300	82.935	85.348
P 500	77.138	76.411

1.4.3 2nd year of a residual effect of a phosphate application (Shallo)

A Purpose : Like the previous trial, this trial carried out at Shallo field has the purpose of evaluating the possible residual effect of P fertilization. It was conducted with the same lau out and with the same randomization as in 1969 and 1970, but without any P fertilization in 1970 and 1971. (see report 1969 page 53 and report 1970 page 34).

B Methods

Lay out : Complete randomized blocks design with 5 replications and 5 treatments.

Plot size : 8 rows of 8.25 meters - 6 Useful rows
Total area : 6.4 x 8.25 = 52.8 m2
Useful area : 4.8 x 8.25 = 39.6 m2

Variety : H 632

Sowing date : April 21 - Harvest 1st November

Fertilization : 1/ Urea : 100 kg/ha at sowing
100 kg/ha at 1st cultivation
2/ Treatments : P fertilization in 1969
a) 0 phosphorus
b) 50 kg/ha Triple super phosphate at sowing time
c) 100 kg/ha " " " " "
d) 300 kg/ha " " " " "
e) 500 kg/ha " " " " "

C Statistical analysis and results

1/ Analysis of variance

Source of variation	F calculated	F 5% Tables
Blocks	0.395	3.01
Treatments	3.036	3.01

General average	77.080	q/ha
Variation coefficient	18.076	%
M.S.D.	6.231	

2/ DUNCAN test

Treatments	Yield q/ha	Test
P 500	89.585	a
P 300	80.671	a
P 100	79.878	a
P 50	75.252	a b
P 0	60.015	b

D CONCLUSION

As we can see, the effect of the 1970 application of phosphate is still noticcable after two years.

This trial and the previous one permit to conclude that, on an economical point of view, the P fertilization (even at resonnable rates) may be considered at Awasa as an investment since its cost will be paid back not only within the same year of application but for several years on.

It is interesting to notice that residual effect exist and are clearly shown in this trial ; applications of 100 kg of P_2O_5 in 1970 (and "a fortiori" higher amounts) give in 1971 significant increase of yield, versus unfertilized plot in 1970.

1.4.4 N.P.K. Ca Fertilizer trial

A Purpose of experiment

This trial has been carried out in Shallo f or four years at the same place and with the same randomization in order to determine fertilizer seeds in this area.
This year, the same trial, conducted on Head quarter was completly destroyed by wild animals ( ) and was not given for analysis.

B Methodology

Lay out : 2^4 factorial design with 4 replications

Plot size : 7 rows of 10 meters - 5 useful rows
Total area : 5.6 x 10 = 56 m2
Useful area : 4.0 x 10 = 40 m2

Variety : H 632

Spacing : 0.80 x 0.28

Sowing date : April 17

Fertilizations : Treatments.
No : 0 Urea : 100 kg/ha Urea
Po : OP, P_1 : 100 kg/ha Triple Superphosphate
K_o : OK, K_1 : 92 kg/ha K_2SO_4
Ca : 0 lime, Ca 300 kg/ha lime

C Statistical Analysis - Results

(See page 38)

Source of variation	F calculated	F 5% Tables
Total		
Residual		
Blocks	3.099	2.81
Effect factorial		
Ca	0.940	4.05
K	3.405	"
Ca X K	0.234	"
P	2.132	"
Ca X P	0.271	"
K X P	0.112	"
Ca X K X P	0.506	"
N	0.203	"
Ca X N	0.588	"
K X N	0.210	"
Ca X K X N	0.115	"
P X N	0.129	"
Ca X P X N	0.052	"
K X P X N	0.081	"

General average : 54.476 q/ha
Standard deviation : 11.744 q/ha
Variation coefficient : 21.559 %

In 1969 and 1970, only the P effect was significant. However, the effect of P in 1970 was stronger than the effect of P in 1969, and similarly for 1969 and 1968.

Before any conclusion is reached on the 1971 trial, it is advisable to wait for the results of the 1972 experiment.

1.4.5 Maize regional uniform phosphorus trial

A Purpose

This trial was carried out at three places of the Awassa Devlopment project in order to determine the effect of a P fertilization on soils where no fertilizer was brought before. On the other hand, this experiment may also indicate the possible residual effect of P if it is conducted for the coming years with the same lay - out and without any more P fertilization.

B Methodology

Locations : Neghelle Arussie 47 km North of Awassa
Dembere Kella 40 km South of Awassa
Sinklle 74 km West of Awassa

Lay out : Complete randomized blocks design with 5 replications and 4 treatments

Plot size : 9 rows of 5 meters - 5 useful rows
Total area : 7.2 x 5 = 36 m2
Useful area : 4.0 x 5 = 20 m2

Spacing : 80 cm between rows and 25 cm on the row
2 seeds/hole thinned

Variety : Synth II S 70

Sowing date : Neghelle and Dembere : May 11
Sinklle : May 6

Fertilizers : 100 kg/ha Urea
Treatments : 1) 0 P_2O_5
2) 50 kg/ha TSP (23 units of P)
3) 100kg/ha TSP (46 units of P)
4) 200kg/ha TSP (96 units of P)

C Statistical analysis and results

1 Average yields of the three locations - Ranking

Negnelle		Dembere Kella		Sinklle	
Treatments	Yield q/ha	Treatments	Yield q/ha	Treatments	Yield q/ha
P 0	6.760	P 0	38.042	P 0	8.840
P 50	20.090	P 50	40.578	P 50	24.270
P 100	31.680	P 200	55.514v	P 100	25.230
P 200	35.810	P 100	55.792	P 200	37.660

2 Analysis of variance and Duncan test at Dembere and Sinklle

Analysis	Locations	Dembere	Sinklle
Blocks variation	F calculated F 5% Tables	0.891 3.26	2.388 3.26
Treatment variation	F calculated F 5% Tables	5.786 3.49	20.940 3.49
General Average	q/ha	47.482	24.000
Variation coefficient	%	18.583	24.032
ETM	q/ha	3.946	2.579

Duncan test

Dembere Kella				Sinklle			
Treatments		Yield q/ha	Test	Treatments		Yield q/ha	Test
P	100	55.792	a	P	200	27.660	a
P	200	55.514	a	P	100	25.230	b
P	50	40.578	b	P	50	24.270	b
P	0	38.042	b	P	0	8.840	c

3 Results analysis at Neghelle Arussie

Analysis	Locations	Neghelle Arussie
Blocks variation	F calculated F 5% Tables	2.300 3.26
Treatments variation	F calculated F 5% Tables	57.763 3.49
General Average	q/ha	23.585
Variation coefficient	%	16.269
ETM	q/ha	1.715

Polynomial coefficients		F calculated	F . 5% Tables
Linear	(1st degree)	147.249	4.75
Quadratic	(2nd degree)	25.450	4.75
Cubic	(3rd degree)	0.590	4.75

Response curve equation (Q/ha)

$Y = - 0.097 x2 + 0.343x3 + 6.382$

Maximum / $Y = 36.514$; $x = 175.649$

Treatments		Average yields	
		Observed	Ajusted
P	0	6.760	6.382
P	50	20.090	21.095
P	100	31.680	30.925
P	200	35.810	35.935

4 Conclusion

The three trials show that a significant response is generally obtained to an application of phosphate.

In two places (SK and N.A.) 50 units of P_2O_5 have increased 3 times the yield as compared with check plot.

It is suitable to follow this experiment in 1972 and 1973 at leart to observe the possible residual effects.

1.5 Weedicides trials (1)

1.5.1 Corn weedicide trial (Post-emergence)

A Method

Lay out : Complete randomized blocks design with 6 Replications and 8 treatments

Plot size : 7 rows of 10 meters long - 5 useful rows
Total area : 5.6 x 10 = 56 m2
Useful area : 4.0 x 10 = 40 m2

Variety : H 632 ; Spacing : 80 x 28 cm.

(1) The two trials described in the following chapter, were performed during 1970 camp

Seed dressing : Fernasan D

Fertilization : 100 kg/ha diammonium phosphate
70 kg/ha urea
all at sowing time.

Treatments : 1/ 2-4D amine salt; 0.75 kg AM/ha (1.5 l comm. Product

2/ 2-4D amine salt; 1.50 kg AM/ha (3.0 l commercial P)

3/ Linuron - 2.5 kg/ha commercial product

4/ Linuron - 5.0 kg/ha commercial product

5/ MCPA - 1.5 l/ha " "

6/ MCPA - 3,0 l/ha " "

7/ one cultivation (June 5) and Hand weeding (Aug 25)

8/ check plot (uncultivated - unweeded)

commercial products : 1 - 2 : weedone
3 - 4 : afalon - hoechst
5 - 6 : U.46.P - BASF

Sowing date : May 8

Germination : May 16

Treatments : June 5 - 6

B Field observations and yield

Treatments	Number of plants per plot	Lodging Number per plot	Yield q/ha
1	178	13	75.6
2	176	06	74.5
3	179	17	78.8
4	177	16	78.9
5	175	13	72.0
6	175	16	75.1
7	177	15	80.1
8	179	16	71.1

Statistical analysis on yield :

Blocks : F calcul	6.339 S		F 5% 2.49	
Treatments: F calcul	1.717		F 5% 2.29	(n.s)
General average :		75.784 q/ha		
Variation coefficient :		8.153 %		
E.T.M. :		2.522 q/ha		

C Weeds observations

- Observations at the beginning of September

Treatments /ha	Galinsoga	Chenopodium	Solanum	Commelina	Graminacée	cyperaceae
24 D-1.5 l	3	2.5	3.2	2.3	3.7	3.7
24 D-3.0 l	2	2	2.2	2.2	2.7	4.2
Linuron 2.5 kg	2	2	2	4.7	2.7	4.2
Linuron 5 kg	2	2	2.7	3.2	3	2.7
MCPA 1.5 l	2	2.5	3.7	2.2	4.5	2.7
MCPA 3.0 l	2.7	2	4.7	2	3.5	4
Hand weeded plot	5	2.5	3.2	3.7	2.5	2
Check	3	3.5	4.5	3.2	4	2.5

1 - No weeds

2 - Very few

3 - No need of weeding

4 - Some weeds

5 - Important

- Observations on 25.1.1971

Very important development during the last months (October to December) of Ageratum in all plots except on plots 4.6.2 ; very few on treatment 1 ; as for Chenopodium, there is more development in plot 8.

D Conclusions

- For all the chemical treatments, no toxicity at all is observed on maize,
- weed control is not sufficient with 2 - 4 - D 1.5 liters per hectare (commercial product),
- after cultivation, there is an important development of Galinsoga ; but are rather controlled because of the aeration of the soil,
- it seems that Linuron is a good weedicide for galin - soga, but not at all for
- MCPA is not effective enough against Solanum and Graminacae,
- no significant difference is observed within the trial. Even the unweeded and uncultivated plots (treatment 8) are not significantly less yielding than other treatments. This may be explained by the low level of infestation of weeds for this trial (which is not frequent at Awasa) as we may see on the scoring figure.

1.5.2 Corn weedicide trial (Pre emergence)

A Method

Lay out : complete randomized blocks design with 8 replications and 4 treatments.

Plot size : 6 rows of 11 meters ; 4 useful rows
total area : 4.8 x 11 = 52.8 m2
useful area : 3.2 x 11 = 35.2 m2

Variety : H 632 ; spacing 80 x 28 cm

Seed dressing : Fernasan D

Fertilization : 100 kg/ha Diammonium phosphate
70 kg/ha urea
all at sowing time

Treatments : 1/ Atrazine - 2.5 kg/ha commercial product

Treatments : 1/ Atrazine - 2.5 kg/ha commercial product (Gesaprim 50 W.P.)

2/ Atrazine - 5.0 kg/ha commercial product (Gesaprim 50 W.P.)

3/ One cultivation (June 5) - Hand weeding (August 25)

4/ No cultivation - No weeding - (Check plot)

Weedicides applied in 750 liters of water/hectar.

Sowing date : May 7

Germination : May 15

Treatments : May 11

B Field observations and yields

Treatments	Number of plants per plot	Lodging Number per plot	Yield q/ha
Atrazine 1	151	16	79.96
Atrazine 2	153	20	82.97
Cultivated plot	153	15	81.80
Check plot	153	15	76.29

N.B. No statistical analysis was performed
No significant difference was expected between the treatments.

C Weeds observations

- At the beginning of september

Treatment	Galinsoga	Chenopodium	Solanum	Comellina	Graminacae	Cyperacae
Atrazine 2.5 kg	< 2	< 1	1.5	2	2.8	2.5
Atrazine 5.0 kg	< 1	< 1	1	1	2.8	2.5
Cultivated plot	3.8	< 2	2.5	2	3.5	2.0
Check plot	< 3	< 3	4.5	3.8	4.5	2.0

1/ No weeds - 2/ very few - 3/ no need of weeding - 4/ some weeds - 5/ important

-- on 25/1/1971

Important development of Ageratum and some chenopodium in plots 4 and 3.

D Conclusions

- No toxicity of Atrazine treatments on the maize.
- The rate of 2.5 liters/hectare of Gesaprim 50 W.P. gives a sufficient control of the different kinds of weeds.
- Atrazine is a better weedicide than the post emergence products like 2-4-D, linuron or MCPA (see previous trial).

2 - WHEAT

INTRODUCTION

In Ethiopia most of the wheat is grown in high altitude zones. The importance of wheat in the Ethiopian agriculture is indisputable, consumption is rising continuously and several imports in present years have been made to meet local demands.

Awasa area is a marginal one for this particular crop. Along with low yield resulting from heavy stemrust poor quality grain is also produced. The grain develops semi-roasted shriveled and, unpleasant appearance.

2.1 National yield trial

Aim

The aim of this trial, which is being conducted in several locations in Ethiopia is to study advanced materials or strains at different altitudes and possibly select varieties that adapt well for each region.

A Methods

Complete blocks with 5 Replications and 15 varieties
Elementary plot = 6 Rows of 2.5m x 1.20 = 3m2
Useful plot = 4 Rows of 2.5m = 2m2
Sowing date = June 25
Fertilizers = 130 kf TSP and 130 kg urea/ha (50-60-0) at planting.

B Field Observation

See page 49

N°	VARIETIES	Height cm	Days to 50% Heading	Stem Rust %	Leaf Rust %	Leaf Blotch %	Glume Blotch %	Grain yield kg/ha
1	Kentana frontana X Mayo 48	100	66	40 S	258	25	-	1855
2	Yaktana 54	117	70	40 MR	-	25	40	1156
3	Salmayo	100	66	25 MR	25 MR	10	-	1703
4	Penjamo 62	77	56	10 MR	-	25	-	1566
5	8156 (W)	72	50	-	-	40	-	2448
6	Supremo Kenya X yaqui 48	90	56	25 MR	-	40	-	1848
7	Sonora 64	72	45	-	-	40	-	1590
8	Sonora 63	72	56	10 MR	5 MR	40	-	2479
9	Alemaya 69	97	66	40 MR	25 MR	40		508
10	Romany	102	66	25 MR	25 MR	10	65	1361
11	Inia 66	72	62	-	-	25	65	819
12	Son 64 Tzpp - Nai 60 (A)	72	62	5 MR	-	25	-	1710
13	36896 C i 5422 X yt 54 A	97	68	-	-	5	5	1268
14	F W/68	72	47	-	-	25	40	1215
15	Kenya 1	107	66	25 MR	25 MR	10	-	1665

C Conclusion

The average yield in 1971 is lower than 1969 and 1970 probably due to the shortage of moisture towards the end of the season.

2.2 Wheat Pre-National Yield Trial 'A'. Early to Medium maturing varieties

The aim of these pre-NYT sets is to serve as screening trials before inclusion of varieties in the regular NYT.

A Methods

Complete blocks with 3 Replications and 17 varieties
Elementary plot = 6 Rows 2.5m = 3m2
Useful plot = 4 Rows of 2.5m = 2m2

Fertilizers = 130kg/ha urea 130 kg/ha TSP at sowing time
Sowing Rate = 125kg/ha, Spacing between row 20cm
Sowing rate = June 26

B Results

N°	Varieties	Ht cm	Days to 50% Heading	Stem Rust, %	Leaf Rust, %	Leaf Blotch %	Glume Blotch %	1000 grain Wt gms	Yield kg/ha
1	11a- 5	110	57	65 MR	10 MR	25	-	31.7	3817
2	12a- 4	87	57	5 MR	10 MR	25	10	30.0	3954
3	14a- 3	82	47	5 MR	5 MR	40	40	23.3	2899
4	38a- 1	97	52	t MR	t MR	10	10	31.7	2589
5	Siete Cerros (8156R)	87	55	t MR	t MR	25	25	28.3	3519
6	(wt X N10-B)J	100	57	25 MR	10 MR	10	40	33.3	3286
7	K 4539 L 30 E 4	105	54	t MR	t MR	10	25	30.0	3264
8	K 4500 L 6 A 4	92	54	t MR	t MR	10	40	26.7	3388
9	K 4496 L 5 A 2	102	43	40 S	t MR	10	-	33.3	2564
10	Sonalika	95	50	10 S	t MR	25	25	43.3	3750
11	Choti Lerma	90	57	t MR	t MR	10	25	31.7	3686
12	C.I. 8154-Fr2	92	43	t MR	t MR	25	40	30.0	2577
13	Son 64 X K1Rend	90	54	t MR	t MR	10	10	31.7	3256
14	Nar 'S' X Pj'S'	75	50	t MR	10 MR	25	-	28.3	3784
15	R -04-04-01 (W)	87	50	-	5 MR	25	-	43.3	3057
16	Ciano F 67	82	54	-	5 MR	10	25	33.3	3354
17	Tezanos Pentos	115	57	25 S	25 S	5	10	30.0	3366

C Conclusion

The entries in this group are rather promissing : average yield 3300 kg/ha, because of the low water holding capacity of the soil in the region, the early maturing varieties have advantage over the late maturing ones towards the end of the season.

2.3 Wheat Pre-National yield Trial 'B' medium to late maturing varieties

The aim of these Pre-NYT sets is to surve as screening trials before inclussion of varieties in the regular NYT.

A Methods

Complete blocks with 3 Replications and 17 varieties
Elementary plot = 6 Rows of 2.5 = 3m2
Useful plot = 4 Rows of 2.5 = 2m2
Fertilizers = 130 kg/ha urea and 130 kg/ha TSr at sowing time
Sowing date = June 26

B Results

N°	Varieties	Ht (cm)	Days to to 50% Heading	Stem Rust %	Leaf Rust %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt (gms)	Yield kg/ha
1	1968 NYT Nº 16	20	61	5 MR	5 MR	25	-	36.7	2142
2	LR P41 60^3	78	61	5 MR	5 MR	25	25	30.0	2567
3	(LR X N10-B)An^3	78	58	25 MR	25 MR	25	-	23.3	2450
4	K 4328 D1 A2	111	76	t	5 MR	40	-	31.7	3371
5	K 4135 H3 D5	99	58	t	5 MR	25	25	23.3	2508
6	PI 297024 (K)	110	76	-	-	5	65	26.7	2142
7	K4527 L45 D1	111	61	5 MR	10 MR	25	65	28.3	3154
8	K4471 E8 E2C	105	89	5 MR	40 S	5	-	26.7	1224
9	PI 293004 (UK)	96	76	5 MR	10 S	65	-	35.0	1595
10	K 4970 L10 BID	109	86	5 MR	5 MR	25	-	23.3	1518
11	K 4970 L10 ASC	112	86	5 MR	40 S	25	-	25.0	1930
12	TP 114/207-208	99	76	5 MR	65 S	25	-	30.0	2508
13	K 4500 L 1A 1A	110	86	5 MR	10 S	25	-	30.0	2278
14	K 4573 L3 D2	106	86	5 MR	5 MR	40	-	30.0	2105
15	PI 293003 (UK)	99	61	5 MR	65 MR	40	25	33.3	2856
16	K 4958 A2 HIB sel	101	76	t	25 MR	40	-	28.3	1833
17	Triticale (Mex 68-69)	114	51	5 MR	40 MR	10	-	43.3	43.73

C Conclusion

The low average yield is attribute to the quick drying cup of the soil towards the end of the rainy season and seams that there late maturing varieties have a little prospect around Awassa.

2.4. 7th International Spring Whest Yield Nursery

A Method

Plot size : 2.5 x 1.20, 6 rows, Net Plot 2.0m2
Fertilizer : 130 kg/ha TSP before sowing
130 kg/ha urea

Sowing dates : June 28
Entries : 49

B Results

N°	Variety cross	Days to 50% Heating	Leaf Blotch %	Glume Blotch %	Leaf Rust, %	Stem Rust, %	1000 Grain Wt (gms)	Grain Yield q/ha
1	Nainari 60	74	25	10	55	-	30	27.2
2	Pitic 62	74	25	25	40 MR	65 MR	25	17.0
3	(Tzpp-Son 64) (LR64ATzpp X Ane)(7)	53	25	-	5 S	40 MR	30	25.5
4	Carazinbo	66	25	-	40 S	15 MR	30	17.4
5	Bonza 55	66	40	10	5 MR	65 MR	30	21.0
6	Pianontes	66	40	10	40 S	10 MR	30	16.5
7	36896-Cj 54[2] X yt 54A (H)	58	40	25	5 S	5 S	30	20.5
8	Penjamo 62	62	40	25	5 S	5 MR	35	36.0
9	Son 64 X Tzpp-Nai 60 (C)	51	40	40	5 S	65 S	25	28.9
10	Caboto	74	25	-	65 S	-	30	24.4
11	C271-wt (E) X Son 64	66	25	25	5 MR	-	35	48.3
12	Pato Argentino	50	25	10	10 S	-	30	32.0
13	Son 64 X Tzpp-Nai 60 (B)	58	40	10	10 MR	-	30	25.9
14	Siete Carros	58	40	40	5 MR	-	30	36.0
15	Zambezi	52	40	40	10 MR	-	30	40.3
16	Giza 155	66	25	-	10 MR	-	40	9.0
17	Syrimex	61	40	25	-	-	30	21.7
18	Napo 63	47	40	-	25 MR	25 MR	35	38.5
19	C 306	66	40	-	10 S	10 S	30	22.7
20	Victor I	90	10	-	40 S	40 S	30	15.0
21	Chris	62	40	-	25 S	5 MR	30	23.5
22	(LR 64 X N 10 B) AN[3] E	66	25	-	25 S	25 MR	30	31.4
23	Saric 70	66	25	40	10 S	-	30	15.8
24	Huelquen	54	40	40	5 MR	-	30	22.3
25	IAS 20 IASSUL	66	25	-	65 S	65 S	30	35.0
26	Turpin 7	66	10	10	5 MR	-	30	18.5
27	Inia 66	56	25	65	5 MR	-	35	40.8
28	Timal	66	25	-	5 MR	-	30	31.5
29	Landi	61	40	-	5 MR	-	30	16.0
30	Crespo 63	61	10	-	80 S	80 S	30	40.3

.../...

N°	Variety cross	Days to 50% Heading	Leaf Blotch %	Glume Blotch %	Leaf Rust, %	Stem Rust, %	1000 Grain Wt (gms)	Grain Yield q/ha
31	Potam 70	49	40	-	5 MR.	-	35	30.9
32	Choti Lerma	62	25	40	5 MR	-	30	32.9
33	Sonalika	50	40	65	10 MR	-	40	31.5
34	Blue Bird	66	25	10	10 MR	5 MR	25	20.5
35	Selkirk	90	25	-	10 S	t S	35	22.8
36	Tob X 8156 (R)	52	25	10	t	-	30	28.0
37	BT 2288	54	40	10	5 MR	10 S	30	30.0
38	Lerma Hojo 64A	57	40	10	5 MR	t	30	32.5
39	Hazera 2152	66	25	10	25 S	40 S	30	30.3
40	Tobari 66	55	25	-	5 MR	-	30	18.2
41	Safed Lerma	66	25	25	5 MR	5 MR	30	19.9
42	Yecora 70	54	40	40	5 MR	5 MR	35	22.2
43	Mexico ~~1~~	74	25	-	65 S	25 MR	25	17.0
44	BT - 2281	53	25	10	25 MR	10 MR	30	25.0
45	Nuri 70	53	40	25	5 MR	-	30	27.5
46	Palmira 1	52	25	10	40 S	25 MR	45	40.8
47	Son 64 X K1. Rend	52	40	10	5 MR	10 MR	35	37.5
48	U.P. 301	56	40	65	t MR	-	30	25.0
49	Buck Manatical	66	40	25	5 MR	5 MR	25	22.4

C Conclusion

Some entries are extremely promissing from the stand point of disease resistance and yield.

2.5 First Cimmyt International Triticale Screening Nursery (ITSN)

A Method

Complete blocks with one Replication and 53 entries
Plot size = 2.50 x 1.20m = 3m2 (6rows of 2.5m)
Fertilizer = 130 kg/ha of TSP before sowing
130 kg/ha of urea " "
Sowing date = June 26, 1971

B) Results

N°	Variety Cross or Pedigree	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt gms	Grain Yield q/ha
1	Armadillo 'S', X 308-27Y-2m-1Y-302B-0N	112	40 MR	-	10	25	40	34.00
2	" ..., X 308- 6Y-2m0Y-302B-0N	120	65 MR	5 MR	25	25	40	33.15
3	" ..., X 308-27Y-2m-1Y-301B-0N	117	65 MR	5 MR	40	10	40	29.65
4	" ..., X 308-27Y-2m-2Y-302B-0N	120	40 MR	-	25	25	40	29.25
5	" ..., X 308-27Y-2m-2Y-303B-0N	122	40 MR	-	25	25	40	33.75
6	" ..., X 308-27Y-2m-2Y-304B-0N	120	40 MR	-	25	10	40	34.00
7	" ..., X 308-27Y-2m-2Y-305B-0N	112	40 MR	25 MR	25	10	40	33.75
8	" ..., X 308- Y-16m-0Y-301B-0N	112	65 MR	5 MR	40	5	40	37.75
9	" ..., X 308- Y-16m-0Y-302B-0N	107	65 MR	-	25	10	50	33.00
10	" ..., X 308- Y-16m-0Y-303B-0N	112	40 MR	5 MR	25	-	45	27.00
11	" ..., X 308- Y-16m-0Y-304B-0N	112	65 MR	5 MR	25	-	45	37.75
12	" ..., X 308-14Y- 4m-0N	117	40 MR	5 MR	10	-	40	43.00
13	" ..., X 308-14Y- 4m-102Y-301B-0N	117	40 MR	5 MR	10	-	40	44.25
14	" ..., X 308-14Y- 4m-102Y-302B-0N	122	25 MR	-	10	-	40	40.25
15	" ..., X 308-27Y- 2m-100Y-310B-0N	122	25 MR	5 MR	10	-	35	34.25
16	" ..., X 308-27Y- 2m-101Y-321B-0N	120	25 MR	-	25	-	36	39.65
17	" ..., X 308-27Y- 2m-100Y-327B-0N	127	10 MR	-	10	-	36	20.15
18	" ..., X 308-27Y- 2m-100Y-328B-0N	127	25 MR	-	10	-	35	23.65
19	" ..., X 308-27Y- 2m-101Y-328B-0N	120	10 MR	-	10	-	30	25.25
20	" ..., X 308-13m-101Y-300B-0N	132	10 MR	-	10	-	30	31.65
21	" ..., X 308-27Y-2m-0Y-302B-0N	125	10 MR	-	10	-	35	28.00
22	" ..., X 308-873-100Y-300B-0N	122	40 MR	5 MR	25	-	35	35.25
23	" ..., X 308-27Y-27m-0Y-310B-0N	122	10 MR	-	25	-	40	23.00
24	" ..., X 308-27Y- 2m-0Y-311B-0N	122	10 MR	-	25	-	30	24.75
25	" ..., X 308-27Y- 2m-0Y-313B-0N	115	25 MR	-	10	-	35	16,25
26	" ...; X 308-919-104Y-302B-0N	117	25 MR	5 MR	25	-	35	31.00
27	" ..., X 308-27Y- 2m-5Y-302B-0N	115	25 MR	5 MR	40	-	50	39.25

N°	Variety Cross or Pedigree	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt gms	Grain Yield q/ha
28	Armadillo 'S', X 308-6Y-2m-100Y- 4B-0N	112	25 MR	-	10	-	40	46.30
29	" ..., X 308-6Y-2m- 0Y- 5B-0N	112	25 MR	-	10	-	40	35.75
30	" ..., X 308-6Y-2m- 0Y- 5B-0N	117	40 MR	-	10	-	40	34.75
31	" ..., X 308-6Y-2m- 0Y-19B-0N	117	40 MR	-	25	-	40	43.25
32	" ..., X 308-6Y-2m-100Y- 3B-0N	112	40 MR	-	10	-	40	32.00
33	" ..., X 308-6Y-2m-100Y- 7B-0N	110	40 MR	-	25	-	45	23.75
34	" ..., X 308-6Y-2m-100Y-10B-0N	110	40 MR	-	25	-	40	24.25
35	" ..., X 308-7Y-4m-100Y- 6B-0N	117	40 MR	-	25	-	40	28.50
36	" ..., X 308-7Y-4m-100Y-11B-0N	112	40 MR	-	25	-	40	25.00
37	" ..., X 308-7Y-4m-100Y-12B-0N	122	40 MR	-	25	-	40	18.50
38	" ..., X 308-7Y-4m-100Y-21B-0N	117	40 MR	-	25	-	40	32.75
39	" ..., X 308-6Y-2m-100Y- 6B-0N	110	40 MR	-	10	-	40	27.25
40	" ..., X 308-6Y-2m-100Y- 4B-0N	110	10 MR	-	10	-	40	39.25
41	" ..., X 308-6Y-2m-100Y- 6B-0N	112	25 MR	-	10	-	40	47.75
42	Badger, F_2 - 68B-13B-0N	112	25 MR	-	10	-	40	39.00
43	" , F_2 - 68B-15B-0N	112	10 MR	-	10	-	40	36.25
44	" , F_2 - 68B-23B-0N	117	10 MR	-	10	-	45	51.00
45	" , F_2 - 68B- 5B-0N	117	10 MR	-	10	-	40	42.50
45	" , F_2 - 68B- 9B-0N	112	25 MR	-	10	-	45	50.50
47	" , F_2 - 68B-10B-0N	110	25 MR	5 MR	10	-	40	49.75
48	6432 - 3 (TRIT)	105	-	-	10	-	30	10.25
49	6447 - 1 (TRIT)	110	-	-	10	-	30	12.50
50	TRIT Bulk (Mex 68/69)	122	-	-	10	-	40	47.25
51	TRIT Bulk Vm 6432-3	110	-	-	5	-	30	15.75
52	Graize Grain	115	-	-	5	-	30	19.25
53	TRIT 204	137	-	-	10	-	30	27.25

2.6. 3rd INTERNATIONAL BREAD WHEAT SCREENING NURSERY

A) Method Complete block with one replication 93 varieties
Plot size = 2.5m x 1.20 = 3 m^2
Date of sowing = June 29
Fertilizers = 130 kg/ha TSP
130 kg/ha urea before sowing

B) Results

Nº	Variety or Cross and Pedigree	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt (gm)	Yield q/ha
1	7 Cerros	85	25 MS	5 MR	25	25	29.8	43.75
2	Super X	82	5 MR	5 MR	25	40	28.7	41.75
3	Noreste	82	5 MR	5 MR	25	40	31.9	39.15
4	Penjamo 62	100	5 MR	5 MR	25	25	34.3	35.65
5	Blue bire // 1=Nuri.70,23584-15Y-6m-0Y	100	5 MR	5 MR	25	-	31.0	33.15
6	Bb Res,23584-15Y-6m-4Y-0N-0Y	87	5 MR	5 MR	25	40	33.2	38.75
7	Ciano-Inia^2 23959-13P-1m-5Y-0M	85	5 MR	5 MR	24	10	32.4	32.50
8	Nap X Tzpp-Son 64/8156R,28071$_p$ 7m-3Y-0M	90	5 MR	5 MR	25	-	28.7	38.50
9	Cno-7Cerros (Son 64-Y50E X Cto/Tob)-25918 - 20Y-1m-4Y-0M	77	25 S	5 MR	25	-	38.2	40.50
10	No66 X Bb, 26481-6T-4m-6Y-0M	82	5 MR	5 MR	25	-	30.4	32.25
11	Son 64- R1.Rend X Bb,26502-8Y-5m-1Y-0M	65	5 MR	5 MR	40	-	36.5	39.65
12	Cno X No,25111-17m-3T-6m-1Y-0M	87	65 MR	25 MR	25	10	33.2	35.0
13	Bb X Nor,67,27106-17m-7Y-0M	87	5 MR	5 MR	25	10	39.3	41.0
14	Res Bb // 2,23584-26Y-2m-1Y-0M-11Y-0M	57	5 MR	5 MR	40	25	34.3	37.75
15	Res Bb // 2,23584-26Y-2m-1Y-0M- 19Y-0M	62	5 MR	5 MR	10	-	26.1	34.30
16	TobX8156 (R),23439-8m-1Y-0Y-22Y	90	5 MR	5 MR	25	-	27.0	38.25
17	Blue bird, 23584-74Y-3m-0Y (1-13Y)	60	5 MR	5 MR	40	-	27.4	27.0
18	Bb 2Resel, 23584-26Y-2m-1Y-0M-86Y-0M	65	5 MR	5 MR	40	-	38.4	46.75
19	Mengavi X 8156 (R)H-223-64-Y-6E-1Y-1C-4Y-3C	77	5 MR	5 MR	10	-	26.7	33.25
20	Ciano X Znia2,23959-27T-4m-4Y-0M-146Y-0M	87	5 MR	5 MR	25	-	34.5	43.90
21	Inia X Bb,26478-7Y-9m-0Y	100	5 MR	5 MR	25	25	34.7	48.25
22	Cno X nad-Chris,23586-21m-1T-3m-1R-0Y	80	5 MR	5 MR	40	5	33.1	46.40
23	Blue bird, 23584-100m-1Y-4m-3Y-0M-0Y	85	5 MR	5 MR	40	10	39.1	42.00
24	Cno X Inia2, 23959-13T-2m-5Y-0M-0Y	85	5 MR	5 MR	40	5	34.4	43.75

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N°	Variety or cross and pedigree	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt (gm)	Yield q/ha
23	Bb X Cno, 26572-61Y-3m-0Y	82	5 MR	5 MR	40	5	31.7	46.40
26	Blue bird, 23584-102m-101Y-100n-300Y	85	5 MR	5 MR	25	5	31.0	34.00
27	Son 64XR1.Rend,19975-68Y-W-6Y-31409E	100	5 MR	5 MR	40	5	38.5	55.00
28	Timgalem, (Aust. N° 3128)	95	5 MR	5 MR	25	5	30.7	31.00
29	Son64A-P4160EXMYE,ANE,II-20811-8E-2E (Ecaudor)	92	5 MR	5 MR	25	5	23.3	27.90
30	LR-N10B X ANE^3= WW15	80	40 MR	5 MR	25	5	26.5	40.50
31	Pato (Rojo)21974-4R-4m-2R-0Y-0P	77	5 MR	5 MR	40	5	27.5	40.25
32	NoXcho 'S' 24941-23m-5Y-2m-0Y	80	5 MR	5 MR	40	5	36.7	36.15
33	Son64-Y50E X Cto/Inia,23528-23m-1T-11m-0Y	85	5 MR	5 MR	25	5	36.7	35.75
34	Cno 67 X 7 Cerros, 25079-68m-2Y-2m-0Y	87	5 MR	5 MR	25	5	31.4	39.75
35	Bb // 4 (Testigo)	80	5 MR	5 MR	25	5	33.6	31.90
36	Son64-R1.Rend/Cno'S' $XRL64^2$-Son64 27139-57m-0Y-300m	92	5 MR	5 MR	40	5	36.4	47.00
37	NP876-Pj62XCal,27110-303m-301Y-300M	90	-	5 MR	10	5	36.4	43.25
38	Bb //4A (R) Resel,23584-26Y-2m-3Y-2m-0Y-300m	75	5 MR	5 MR	10	5	36.3	24.75
39	(Son64 X SKE-ANE/ST464-BZ'S') (K1.Pet. Raf X 8156 (R^2) 30724-1m-0Y	97	5 MR	5 MR	25	5	35.1	46.50
40	Wt^3.E-Nar X Sta.E/var)Cno-Pj62,30903-8m-0Y	105	5 MR	5 MR	25	-	34.7	39.00
41	Bb X Inia67,30573-23m-0Y	85		5 MR	40	-	33.8	30.00
42	(12300 X LR64A - 8156)Nor 67,30842-31R-2m-0Y	97		5 MR	25	-	35.0	47.75
43	Son64A X SKC-LR64A/Son64-R1.Rend, MV0745-7Y-3m-0Y	97		5 MR	25	-	34.2	40.75
44	Cno 'S' (Wte-Nar59 X S.E/Var 'S'), 27829 - 19Y-1m-0Y	97		5 MR	25	-	31.8	42.00
45	Cno 'S' (Wte-Nar.59XS.E/Var'S'),27829-19Y-1m-0Y	100		5 MR	25	-	36.5	32.00
46	Cno 'S' (Wte-Nar.59 X S.E/Var 'S'), 27829-19Y-3m-0Y	97		5 MR	25	-	38.6	44.00
47	Cno 'S' X Bb,27845-5Y-3Y-0Y	90		5 MR	25	-	35.4	33.75
48	$Inia^2$/XOn64-Y50E Gto,2856-11Y-5m-0Y	90		5 MR	25	-	31.7	50.75
49	7 Ceros	95	5 MR	5 MR	25	-	37.8	47.00
50	Nor67 X Bb,27864-6Y-1m-0Y	92	5 MR	5 MR	25	-	28.7	34.25

N°	Variety or cross and pedigree	Ht. (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt (gm)	Yield q/ha
51	Nor67 X Bb,27864-10Y-1m-0Y	95	5 MR	5 MR	40	-	27.2	42.25
52	Nov67 X Cno'S'-Inia'S',27865-4Y-4m-0Y	85	5 MR	5 MR	40	-	35.6	40.00
53	Nov67 X Cno'S'-Inia'S',27865-28Y-1m-0Y	90	5 MR	5 MR	25	-	36.4	49.75
54	Nor67 X Cno'S' Son64,27868-28Y-1m-0Y	87	5 MR	5 MR	25	-	37.4	40.00
55	LR64^2 - Son64 (Son64-Y50EXGto/N°'S') 27944021Y-1m-0Y	90	5 MR	5 MR	40	-	35.0	33.00
56	NP876-Pj62 X Cno 'S' - Pj62,27983-21Y-1m-0Y	92	5 MR	5 MR	25	-	30.4	33.75
57	NP876-Pj62 X Cno 'S' - Pj62,27983-30Y-2m-0Y	90	5 MR	5 MR	40	-	31.7	31.00
58	NP876-Ph62/Cno 'S' X LR64-Son64,28040-21Y-1m-0Y	95	5 MR	5 MR	25	-	36.3	42.65
59	(Son64-Y50E x Gto/Inia)Cno 'S' Son64, 28076-17Y-1m-0Y	80	25 MR	5 MR	25	-	38.2	39.25
60	(Son64-Y50E x Gto/Inia)Cno 'S' Son64, 28084-17Y-3m-0Y	85	5 MR	5 MR	25	-	33.3	40.25
61	Bb x Cno 'S' - Son64,28146-10Y-1m-0Y	90	5 MR	5 MR	25	-	33.1	45.50
62	Bb x Calidad, 28207 -24Y-1m	80	5 MR	5 MR	25	-	33.7	42.00
63	Tobari 66	90	5 MR	5 MR	25	-	28.7	32.65
64	Cno-01Sen x Bb, 28560-19Y-1m-0Y	80	5 MR	5 MR	25	-	33.7	34.50
65	Bb x Nor.67, 30400-34Y-1m-0Y	85	5 MR	5 MR	25	-	38.9	29.50
66	Cno 'S' x 01Sen, 26931-1m-1Y-1m-0Y	80	5 MR	5 MR	40	-	33.1	35.65
67	Cno 'S' x Sonalika, 26933-73m-7Y-1m-0Y	95	5 MR	5 MR	40	-	37.9	40.75
68	Cno 'S' x Bb, 26939-59m-1Y-1m-0Y	85	5 MR	5 MR	40	-	32.6	33.00
69	Cno 'S' x Bb, 26939-59m-3Y-5m-0Y	80	5 MR	5 MR	40	-	38.1	37.75
70	Cno 'S' x Bb, 26939-89m-1Y-4m-0Y	75	5 MR	5 MR	40	-	37.1	36.65
71	HD 832-5-5-0Y x Nor.67,27037-63m-2Y-2m-0Y	100	5 MR	5 MR	40	-	40.7	31.65
72	HD 832-5-5-0Y x Bb, 27047-51m-2Y-1m-0Y	92	5 MR	5 MR	25	-	46.8	26.00
73	Azteca	92	5 MR	5 MR	25	-	34.4	42.75
74	Bb x On, 27098-1m-4Y-2m-0Y	102	5 MR	5 MR	25	-	35.2	35.75
75	Bb x On, 27100-105m-1Y-1Y-1m-0Y	87	5 MR	5 MR	40	-	37.8	32.25
76	Bb x On, 27100-110m-1Y-3m-0Y	90	5 MR	5 MR	25	-	40.1	43.25

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N°	Variety or cross and pedigree	Ht. (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt (gm)	Yield q/ha
77	Bb x On, 27100-110m-3Y-4m-0Y	80	5 MR	5 MR	25	-	39.7	34.40
78	Bb x On, 27100-135m-1Y-1m-0Y	80	5 MR	5 MR	25	-	42.1	32.25
79	Meng-8156 (R)Var 'S'/6 Cerros,27105-21m 1Y-5m-0Y	75	5 MR	5 MR	25	-	28.7	29.15
80	Meng-8156 (R)Var 'S'/7 Cerros,27105-21m 1Y-6m-0Y	87	5 MR	5 MR	25	-	26.8	30.15
81	(Meng-8156 (R) x Var 'S') (TH^3/Fn^2 x R58-N) 27106-23m-1Y-2m-0Y	87	5 MR	5 MR	25	-	29.9	29.75
82	(Meng-8156 (R) x Var 'S') (Th^3/Fn^2 x R58-N) 27106-23m-1Y-3m-0Y	70	5 MR	5 MR	25	-	31.4	38.25
83	Cnos 'S' x Cal, 27129-1m-1Y-1m-0Y	60	5 MR	5 MR	40	-	29.8	35.00
84	Son64-R1,Rend/Cno 'S' x $LR64^2$.Son64,27139-68m-1Y-1m-0Y	80	5 MR	5 MR	25	-	33.8	42.65
85	01Sen x Tob66,27158-7m-3Y-3m-0Y	100	5 MR	5 MR	25	-	26.6	31.00
86	01Sen x Tob66,27158-7m-3Y-6m-0Y	92	5 MR	5 MR	25	-	29.0	32.15
87	Cal/Cno 'S' x $LR64^2$, Son64,27169-48m-1Y	80	5 MR	5 MR	25	-	35.8	34.15
88	Blue bird ## 4 (Check)	67	5 MR	5 MR	20	-	32.9	18.00
89	LR64-Son64 x 7 Cerros, 27175-1m-1Y-1m-0Y	85	5 MR	5 MR	25	-	34.3	38.15
90	LR64-Son64 x 7 Cerros, 27175-1m-1Y-3m-0Y	95	5 MR	5 MR	25	-	31.6	33.75
91	LR64-Son64 x Tob66, 27180-26m-4Y-4m-0Y	82	5 MR	5 MR	40	-	33.1	41.25
92	Cno^2 x Chris,27341-1m-1Y-2m-0Y	95	5 MR	5 MR	25	-	32.8	47.25
93	Ciano 'S' x Ca1,27449-13m-1Y-1m-0Y	80	5 MR	5 MR	25	-	31.2	36.00

2.7 1st INTERNATIONAL DURUM WHEAT SCREENING NURSERY

A) Method

Spacing = 1 row of 5m
Fertilizer = 130 kg/ha urea, 130 kg/ha TSP at sowing
Sowing date = June 29
Entries = 58

B) Result

N°	Variety name	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain Wt gm	Yield q/ha
1	CAPEITI	90	40 S	25 MR	25	10	30.4	19.0
2	7 Cerros	75	25 S	25 MR	40	10	30.5	40.0
3	LD 35E-TC^2 x AA 'S',D27530-2m-3Y-2m-0Y	60	25 S	25 MR	25	10	34.2	20.0
4	LD357E-TC^2 x AA 'S',D27530-2m-3Y-5m-0Y	65	40 MS	25 MR	25	10	34.8	26.3
5	LD357E-TC^2 x A1 'S',D27534-1m-1Y-1m-0Y	75	40 MS	25 MR	25	10	32.5	26.0
6	(BY^{2}E-TC/TACE-TC^2) B.Ba1/BY^{2}E-Tc, D27548-2m-1Y-1m-0Y	70	40 MR	25 MR	25	10	34.2	17.0
7	(BY^{2}E-TC/TACE-TC^2) B.Ba1/BY^{2}E-Tc, D27548-5m-1Y-1m-0Y	75	40 MR	25 MR	25	10	40.8	20.3
8	(BY^{2}E-Tc/TacE-Tc^2) B.Ba1/By^{2}E-Tc D27548-5m-1y-2m-0Y	75	65 S	40 MR	25	10	39.5	22.5
9	(By^{2}E-Tc/TacE-Tc^2) B.Ba1/By^{2}E-Tc D27548-5m-1y-3m-0Y	75	25 MR	40 MR	25	10	36.1	28.0
10	(By^{2}E-Tc-TacE-Tc^2) B.Ba1 x By^{2}E-Tc, D27550-3m-1y-1m-0Y	70	10 MR	5 MR	25	10	36.8	18.0
11	(ByE^2-Tc/TACE-Tc^2) B.Ba1 x By^{2}E-Tc, D27550-3m-1y-3m-0Y	70	65 S	5 MR	25	10	36.5	17.5
12	(By^{2}E-Tc/TACE-Tc^2) B.Ba1 x By2E-Tc, D27550-9m-5Y-1m-oy	65	10 MR	5 MR	25	10	37.3	20.0
13	BRANT 'S',D24102-9y-3m-0y	70	10 MR	5 MR	25	10	30.4	20.5
14	(By^{2}E-TACE x Tc^4) (LD 357E-TME/2-BxW) D-27552-20m-3y-1m-0Y	60	25 MR	5 MR	25	10	34.4	25.5
15	By^{2}E-TACE x TC^4/AA 'S', D-27575-6m-5Y-2m-0Y	65	10 MR	5 MR	25	10	33.3	18.0
16	By^{2}E-TACE x TC^4/AA 'S', D-27575-67-5Y-4m-0Y	65	10 MR	5 MR	25	10	31.1	18.0
17	(By^{2}E-TACE x Tc^4/) (61-130 x 60-115) (TmE-Tc^2/Z-BxW), D2758-1m-3y-1m-0y	70	25 MR	25 MR	25	10	35.4	16.0

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N°	Variety Name	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain wt, gms	Yield qt/ha
18	(By^2E-TacE x Tc^4) (61-130 x 60-115) (TME-Tc^2/Z-BxW), D-2752-1m-3y-4m-0y	75	25 MR	25 MR	25	10	35.4	19.0
19	(By^2E-TACE x Tc^4) (61-130 x 60-115) (TME-Tc^2/Z-BxW), (D27582-1m-4y-2m-0y)	60	5 MR	5 MR	25	10	34.0	14.5
20	(By^2E-TAC x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW), D27582-1m-4y-3m-0y	65	5 MR	5 MR	25	10	38.5	14.0
21	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW), D-27582-8m-1y-4m-0y	70	40 S	10 MR	25	10	36.5	18.0
22	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW), D-27582-8m-1y-5m-0y	65	5 S	5 MR	25	10	37.3	15.3
23	(By^2E-TACE x Tc^4) c61-130x60-115 (TME-Tc^2/Z-BxW), D-27582-8m-6y-2m-0y	70	5 S	5 MR	25	10	34.2	15.0
24	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW), D-27582-8m-12m-1m-0y	75	5 S	5 MR	25	10	35.4	16.0
25	(By^2E-TACE x Tc^4) c61-130x60-115) TME-Tc^2/Z-BxW), D-27582-8m-12y-4m-0y	70	5 S	5 MR	25	10	32.6	16.5
26	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW) D-27582-8m-12y-5m-0y	70	5 MR	5 MR	25	10	34.0	20.0
27	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc2/Z-BxW) D-27582-8m-13y-1m-0y	75	5 MR	5 MR	25	10	32.5	17.5
28	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW) D-27582-8m-13y-2m-0y	75	10 MR	5 MR	25	10	32.1	19.0
29	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW) D-27582-8m-13y-4m-0y	65	10 MR	5 MR	25	10	33.9	18.5
30	(By^2E-TACE x Tc^4) c61-130x60-115) (TME-Tc^2/Z-BxW) D-27582-5m-2y-5m-0y	70	10 MR	5 MR	25	10	33.0	14.3
31	Jori C - 69	70	10 MR	5 MR	25	10	34.5	12.5
32	(By^2E-TACE x Tc^4) CLD-357xTc^2) (TME-Tc^2/Z-BxW) D-27568-5m-3y-1m-0y	65	10 MR	5 MR	25	10	29.0	15.0

N°	Variety Name	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain wt, gms	Yield qt/ha
33	(By^2E-TACE x Tc^4) CLD-357 x Tc^2) ($TME-Tc^2/Z-BxW$) D-27592-5m-3-Y-1m-Oy	60	10 MR	5 MR	25	10	27.7	12.5
34	(By^2E-TACE x Tc^4) CLD-357 x Tc^2) ($TME-Tc^2/Z-BxW$) D-27592-5m-2y-1m-Oy	70	5 MR	5 MR	25	10	32.7	18.5
35	(By^2E-TACE x Tc^4) CLD-357 x Tc^2) ($TME-Tc^2/Z-BxW$) D -27591-5m-2y-2m-Oy	65	5 MR	5 MR	25	10	31.9	18.0
36	(By^2E-TACE x Tc^4) CLD-357 x Tc^2) ($TME-Tc^2/Z-BxW)_4$ D-27591-6m-4y-2m-Oy	70	5 MR	5 MR	25	10	37.0	14.0
37	(By^2E-TACE x Tc^4) (LD-357 x Tc2) ($TME-Tc^2/Z-BxW)_4$ D-27591-8m-1Y-2m-Oy	75	5 MR	5 MR	25	10	29.9	14.5
38	(By^2E-TACE x Tc^4) (By^2E-Tc x Stw63/AA 'S'), D-27591-8m-1y-3m-Oy	80	5 MR	5 MR	25	10	28.2	11.8
39	(By^2E-TACE x Tc^4) (By^2E-Tc x Stw63/AA 'S'), D-27591-12m-1y-1m-Oy	65	5 MR	5 MR	25	10	27.3	12.0
40	(By^2E-TACE x Tc^4) (By^2E-Tc x Sw63/AA 'S'), D-27591-12m-1y-3m-Oy	60	5 MR	5 MR	25	10	27.8	5.5
41	(By^2E-TACE x Tc^5) D-27595 - 2m-1y-4m-Oy	65	10 MR	5 S	25	5	28.1	13.0
42	By^2E - TACE x Tc^5, D-27617 - 9m-5y-5m-Oy	80	10 MR	5 S	25	5	39.6	20.5
43	By^2E - TACE x Tc^5, D-27617 - 18m-6y-1m-Oy	75	10 MR	5 S	25	5	28.1	12.8
44	B.Ba1-By^2E x Tc/Cr'S', D-27668-6m-1y-1m-Oy	70	10 MR	5 S	25	5	35.3	15.5
45	($TME-Tc^2/Z-BxW$) (6-115xRL-3601) D-26833-12y-1m-2y-2m-Oy	65	10 MR	5 S	25	10	31.3	17.3
46	($TME-Tc^2/Z-BxW$) (6-115xRL-3601) D-26833-12y-1m-3y-2m-Oy	65	25 MR	5 MR	25	10	30.2	19.0
47	($TME-Tc^2/Z-BxW$) (St,-LD537xLD 357/DuF_4 LDN) D-26838-6y-1m-3y-1m-Oy	50	10 MR	5 MR	25	10	28.2	8.0
48	($By^2E-Tc/TACE-Tc^2$) (By^2E-TcxStw63/AA'S') D-27591-12m-1y-OM	70	10 MR	5 S	25	10	25.2	11.5
49	($TME-Tc^2/Z-BxW$) 60-115xRL-3601, D-26833-12y-1m-1y-OM	65	10 MR	5 S	25	5	29.3	15.5

N°	Variety Name	Ht (cm)	Leaf Rust, %	Stem Rust, %	Leaf Blotch %	Glume Blotch %	1000 Grain wt, gms	Yield qt/ha
50	(TME-Tc^2/Z-BxW)60-115xRL-3601, D-26836-1y-1m-1y-0M	70	10 MR	5 S	25	5	31.1	20.0
51	B.Ba1-By^{2}ExTc, D-25550-10m-5y-1m-2y-0m	75	5 S	5 S	25	5	32.2	9.5
52	B.Ba1-By^{2}ExTc, D-25550-10m-5y-1m-2y-1m-0y	65	5 S	5 S	25	5	34.3	13.5
53	Chap/By^{2}F-Tc x TACE-TC, D-25665-6m-2y-1m-0y	70	5 S	5 S	25	5	30.1	17.3
54	LD357E-Tc^2 x AL$_4$'S', D-27534-12m-1y-0M	75	5 MR	5 MR	25	5	33.5	10.5
55	C ByE-TACE x TC^4/61-130-60-150 (TME-Tc^2/Z-BxW) D-27582-8m-12y-0M	70	5 MR	5 MR	25	5	34.6	15.0
56	JoRI C - 60	70	5 MR	5 MR	25	5	36.8	13.0
57	C ByE-TACE x Tc^4/LD357E-Tc^2) (TME-Tc^2/Z-BxW) D-27588-5m-2y-0M	65	5 MR	5 MR	25	5	37.0	21.0
58	By^{2}E-TACE x Tc4/B.Ba1 x By^{2}E-Tc, D-27589-1m-5y-0M	75	5 MR	5 MR	25	5	28.4	21.0

2.8. Senegal varieties observations

A) Methods

Plot size = 4m x 1.20 = 4.80 m^2, 6 Rows of 4m

Useful plot = 4m x 0.80 (4 Rows of 4m)

Fertilizer application = 130 kg/ha TSP before sowing
130 kg/ha Urea before sowing

Sowing date = 30 th June 1971

Harvesting date = 11 th November 1971

B) Results

N°	Varieties	Height (cm)	1000 Grain wt (gms)	Yield (kg/ha)
1	Son 63	97	28.40	3658
2	9 0 8	99	29.60	3416
3	Inia 66	93	24.80	2368
4	NP 832	122	38.55	2746
5	3597	95	28.80	3366
6	LR64 x N10B	84	22.55	2652
7	Son X Skels	87	21.90	2582
8	Victor 1	97	22.85	707
9	Nainari 60	113	32.20	2340
10	Penjamo 62	99	31.55	3473
11	Pitic 62	101	19.80	936
12	Grabo 62	106	32.50	2301
13	Mexi pak	99	30.10	3374

2.9 Wheat CCC Observation

A Methods

Complete blocks with 2 Replications
Elementary plot = 3.6 x 12 = 4 - 2m2
Useful plot = 2.8 x 12 = 33 - 6m2
Spacing = 20cm between rows
Rate of sowing = 130 kg/ha
Variety = Romany
Seed Dressing = Fernasan D
Fertilizer = 100 kg/ha TSP, and 100 kg/ha urea before sowing
100 kg/ha urea at tilling stage with light cultivation.
Sowing date = July 6th
Treatments = 2 Replications/treatment
1 = Check (untreated)
2 = CCC 1.5 kg of Am/ha cycocel BASF 40% (3.75 lit of Cp/ha)
3 = 3.0 kg of Am/ha cycocel BASF 40% (7.5 lit of Cp/ha)

B Results

N°	Treatment	Leading %	Height (cm)	Yield Kg/ha
1	Check	82	117	1757
2	CCC 1.5kg of Am/ha	71	112	1957
3	CCC 3.0kg of Am/ha	62	111	2047

C Conclusion

2.10 Wheat Weedicide Trial

A Methods

Design = Complete block with 4 Replications
Elementary plot = 8m x 3m = 24m2
Useful plot = 8m x 2.6m = 20.8m2
Spacing = 20cm between rows
Rate of sowing = 100 kg/ha
Variety = Sonora 63
Seed Dressing = Fernasan D
Fertilization = 100 kg/ha urea before sowing
100 kg/ha TSP before sowing
Sowing date = July 6

Weedicide application : 1 and 2 on August 18, 3 and 4 August 19

Treatments
1. 2.4 D (U-46 D fluid) 1.5 lt/ha cp
2. - 2.5 lt/ha cp
3. MCPA (U-46 M fluid) 1.75 lt/ha cp
4. - - 3.75 lt/ha cp
5. Check

B Results

N°	Treatment	Rate (cp)	Yield kg/ha
1	2.4.D.	1.5. lt/ha	2642
2	2.4.D.	2.5 lt/ha	2521
3	MCPA	1.75 lt/ha	2271
4	MCPA	3.75 lt/ha	2289
5	Hand weeding		3119
6	Check		1528

C Conclusion

Field observation made during the vegetation period indicate 2.4 D at 1.5 lt/ha cp was not effective in controlling Amaranthus and Ageratum species. Thigher dose of the same compound also didn't control Ageratum. MCPA at 1.75 lt/ha cp didn't control datura and Solanum effectively. Also the higher rate of this latter weedicide didn't control Amaranthus. Galinsoga population was very high but was completely controled. Finally the higher dose of the two weedicide seem to effectively control broad leave - weeds if timely applied, no side effect sort was observed on the crop.

2.11 NP Fertilization Trial

Them aim of this trial was to study the interaction between N and P fertilization.

A Methods

Factorial N.P. with 3 levels of P and 4 levels of N. Complete blocks with 4 Replications and 12 Treatments.

Treatment	0	1	2	3
Units of N/ha	0	50	100	150
Units of P/ha	0	50	100	-

Triple Superphosphate applied before sowing
Urea applied half before sowing halt at tillering stage
Elementary plot = 10m2
Useful plot = 8m2
Sowing date = July 12th
Space between rows = 20cm
Seed dressing = Fernasan D
Emergence date = July 18th
Hand weeding = August 14th
Harvesting date = November 19th

B) Results

Treatment	N	0	1	2	3	0	1	2	3	0	1	2	3
	P	0	0	0	0	1	1	1	1	2	2	2	2
Yield (kg/ha)		3503	3353	2177	1124	3396	2468	2061	2129	3094	1540	1274	1252

C) Conclusion

There was no discernible pattern of response. The higher combination of N and P seems to depress yield.

3. - TEFF

Growing teff in the region of Awassa is limited by several factors such as heavy lodging, poor grain quality and negligible response. Improving teff yields in the future depends mainly upon good varieties, exhausting certain cultural techniques such as optimum sowing dates and proper seed bed preparation.

3.1 National Yield Trial (Trial N°1)

This trial was conducted at 12 locations all over the country varying both in altitude and soil characteristics. Among these Awassa at an altitude of 1600 meters is a marginal region for teff production and yields were rather poor as compared to other localities.

A Methods

Complete blocks with 4 replications	
ELementary plot	10 m2
Rate of sowing	25 kg/ha
Seed dressing	Fernasan D
Fertilization	100 kg/ha urea
	100 TSP at sowing
Date of sowing	July 29, 1971
Date of harvesting	December 7, 1971

B Results

Varieties	1	2	3	4	5
Dz-01-99	R	13.10	6.93	1	1
Dz-01-200	W	9.41	4.85	2	4
Dz-01-354	W	9.40	3.01	8	5
Dz-01-323	W	8.80	4.23	4	8
Dz-01-257	W	9.20	4.20	5	7
Dz-01-238	W	11.30	4.29	3	2
Dz-01-248	W	7.35	2.55	10	9
Dz-01-72	R	9.50	3.84	6	3
Dz-01-26	W	6.20	2.84	9	10
Location selection	W	9.36	3.51	7	6

Average yield, q/ha 4.02
Coefficient of variation, % 26.7

(1) Color, R (red) W (white)

(2) Yield in qt/ha in 1970

(3) Yield in qt/ha in 1971

(4) Ranking in 1971

(5) Ranking in 1970

C Conclusion

Average yield in 1971 was even lower than the past years owing in part due to the complete lodging observed. There was significant differences between the varieties with regard to yield but too high variation coefficient (26,7 %). DZ-01-99 is the highest yielder, nearly 7 qt/ha.

3.2 Sowing Date Trial (Trial N°2)

Similarly to 1968 and 1970 the aim of this trial was to determine the best sowing dates for two varieties (1-44, DZ-01-238)

A Methods

Complete blocks with 4 replications
Factorial sowing dates (4) x varieties (2)
Sowing dates 1 - July 10
2 - July 27
3 - August 11
4 - August 25
Varieties 1 - 1-44 (red)
2 - DZ - 01 - 238 (white)
Elementary plot 12 m2
Seed dressing Fernasan D
Fertilization 100 kg/ha of triple superphosphate
100 kg/ha Urea at sowing time

B Results

	A - 44	DZ - 01 - 238
	Yield (q/ha)	Yield (q/ha)
SD1	3.23	2.25
SD2	2.53	1.00
SD3	1.40	0.73
SD4	1.80	0.73

Average yield (qt/ha) 1.77
Coefficient of variation % 44.7

C Conclusion

This trial is not statistically useful with very low yielding average and very bad variation coefficient. The results obtained are also in contrary to the results of previous years : the end of july has been found to be the optimum sowing time after 3 years of experimentation.

3.3 Herbicide Trial (Trial N°3)

The purpose of this post emergence herbicide trial was to study weed control in general and also to observe the resistance of the teff plant itself to varying amounts of herbicides

A Methods

Complete blocks with 4 replications and 8 treatments
Variety DZ-01-238
Elementary plot - 24 m2
Rate of sowing - 20 kg/ha
Date of sowing - July 28
Date of 50 % heading -September 30
Harvesting date - December 16

B Treatments

1 2.4-D (U-46 D fluid) 1.5 l/ha C.P.
2 2.4-D (U-46 D fluid) 2.5 l/ha C.P.
3 MCPA (U-46 M fluid) 1.75 l/ha C.P.
4 MCPA (U-46 M fluid) 3.75 l/ha C.P.
5 Check - No weeding and no chemical application

The herbicide were applied on August 31st at 5-6 leaf stage.

C Results

The check plot had more weed counts than the treated fields including solanum, galinsoga, chenopodium and other weed species.

Treatments	1	2	3	4	5
Yield, q/ha	5.28	5.09	5.40	3.69	1.66

Average yield, qt/ha 4.05, treatments followed by the same line are not significantly different from each other

Coefficient of variation, % 16.8

D Conclusion

Treatments were highly significant with good variation coefficient (16.8%). The check plot had more weed counts than the treated fields including Solanum, Galinsoga, Chenopodium and other weed species and as a result produced very low yield. Treatment 4 is significantly lower than the three others : the high dosis of MCPA seems to be depressive on teff yield (3.7 qt/ha against 5.1 to 5.4 for treatments 1, 2 and 3).

3.4 Fertilizer trials - Early and late plantings (Trials N°4-5)

The aim of this trial was to study the interactions between P and N fertilization.

A Methods

Factorial NP with 3 levels of P and 4 levels of N. Complete blocks with 4 replications and 12 treatments with early and late sowings.

Treatments	0	1	2	3
Units of N/ha	0	50	100	150
Units of P/ha	0	100	200	x

Fertilizer applied at sowing N as urea and P as TSP (triple super phosphate).

Variety : A-44
Plot size : 10 m2
Seed dressing : Fernasan D
Rate of sowing : 25 kg/ha
Date of sowing : Early sowing : July 29, 1971
Late sowing : August 23, 1971
Date of harvesting : Early December 14, 1971
Late December 17, 1971

B Results

a) Early sowing : July 29, 1971 (trial N°4) Yields (qt/ha)

N	0	0	0	1	1	1	2	2	2	3	3	3
P	0	1	2	0	1	2	0	1	2	0	1	2
	4.6	5.0	5.6	6.0	5.3	5.6	4.8	4.5	6.0	4.8	5.2	5.9

Average yield, qt/ha 5.3
Coefficient of variation, % 24.7

b) Late sowing : August 23, 1971 (trial N°5) Yields (qt/ha

N	O	O	O	1	1	1	2	2	2	3	3	3
P	O	1	2	O	1	2	O	1	2	O	1	2
	5,7	8,2	10,2	7,8	9,0	9,0	6,1	8,0	10,5	7,3	10,0	10,3

Average yield, qt/ha 8.5
Coefficient of variation, % 21.0

C Conclusions

This trial was statistically highly significant only on late sowing date. The late sowing resulted in higher average yield, 8.5 qts as opposed to 5.3 qts of the early sowing. Reponse to fertilization was not distinct enough at both sowing times for N response. For the late sowing date, phosphorus response is linear, starting from 6.7 qt/ha with 0 ; 8.8 qt/ha with 100 ; 9.9 qt/ha with 200 units.

3.5 The effects of sowings rate, rolling and cross killing on yield of teff (Trial N°6)

The purpose of this trial was to see the effect of an interaction between varying sowing rates, rolling VS, non rolling, and cross killing VS non cross killing of seed bed preparation.

A Methods

Complete blocks with 4 replications
Variety : A-44
Elementary plot : 10 m2
Date of sowing : July 30
Date of harrowing : September 2
Date of harvesting : December 13
Fertilization : 80kg urea and 80 TSP before sowing
Fertilization

B Treatments (parameters of yield)

1) Rate of sowing

a) 10 kg/ha
b) 15 kg/ha
c) 20 kg/ha

2) Rolling (packing)

R - Rolled
Ro - No rolling

3) Cross killing

C - Cross killing
Co - No cross killing

C Results

Treatment	Yield,qt/ha
ABC	5.65
ARCo	6.51
ARoC	4.85
ARoCo	5.88
BRC	7.71
BRCo	4.48
BRoC	4.65
BRoCo	5.58
CRC	5.51
CRCo	6.03
CRoC	5.74
CRoCo	5.55

D Conclusions

Treatments were non significant. To augment teff yield these cultural practices must be properly exhausted along with varieties.

4 - BEANS - 1971

4.1 Beans collection

Twenty six varieties were compared to MPBT in order to know if some of them are interesting either by the yield or by tolerance to diseases. Like in 1970, the check variety was MPBT because it is very well adapted to Awassa area.

A Methodology

Location	: Head quarter
Lay-out	: Two replications - 26 varieties One check plot every two plots
Plot size	: 4 rows of 8 meters - 2 useful rows Total area : 1.6 x 8 = 12.80 m2 Useful area : 0.80 x 8 = 06.40 m2
Fertilizer	: 200 kg of 15 - 15 - 15 at first cultivation
Spacing	: 40 cm between rows. On the row according to the varieties (cf à B)
Sowing date	: 12 July
Germination	: 19 July
Harvest	: According to the cycle (cf à B)

B - FIELD OBSERVATIONS

Varieties	Spacing on the row (cm)	Harvest
Colcured bean spotted	25	Nov.2
Content	"	" "
West german Yellow	"	" "
Red Wollamo Sodo	"	" 4
Nazareth small	15	Oct. 18
Buff Beauty brown	25	Nov. 2
Black Dessie	"	" 4
Buff Beauty Yellow	"	" 2
Borlotti	"	- -
Satin P	"	Nov. 2
Canallini	"	" "
HLN	"	" "
VREX	"	" "
HLV	"	" 4
HLEY	"	- -
HGN	"	Oct.19
FBMD	"	Nov. 4
FBP	"	Oct. 19
Sanilac	15	" "
Long Black Dessie	25	" "
Bilate 48	"	- -
Bilate 14	"	Oct. 19
Bilate 50	"	Nov. 4
Triumph of Farcy	"	Oct. 19
Tengeru 16	"	Nov. 4
Mexican 142	"	" "
MPBT (check Plot)	15	Nov. 2

The folowing scale was used :

0 - No attack
1 - Rarely observed
2 - Little development
3 - Medium development
4 - Important development
5 - Very important development

The average numbers found for MPBT (check) are :

Anthracnose - Pod : 1.25
" - Leaf : 1.83
Rust : 2.33

Considering these numbers as a criteria ; the following varieties have to be mentioned as interesting varieties.

Coloured bean spotted, Black Dessie, VREX, HLV, HGN, Sanilac, Long Black Dessie, Bilate 14, Bilate 48, Mexican 142.

C Results

Varieties	Yield (1) q/ha	Yield (2) % of check	Ranking 1971	Ranking (3) 1971	Ranking 1970	Ranking 1969
MPBT (check)	30.48	100	3	2	3	3
Coloured spotted	11.20	39	16	12	12	5
Content	13.51	45	14	10	11	4
West German Yellow	23.90	84	5	3	5	15
Red Wollamo Sodo	31.87	119	1	1	1	2
Nazareth small	05.65	16	26	20	18	14
Buff beauty brown	18.90	63	9	6	9	9
Black Dessie	17.10	58	11	8	2	1
Buff beauty Yellow	19.45	61	10	7	7	17
Borlotti	21.67	69	7	4	10	6
Satin P	16.71	52	13	9	4	7
Canallini	12.29	39	16	12	13	10
HLN	11.48	38	18	14	15	16
VREX	08.82	28	22	17	16	11
HLV	12.10	35	19	15	17	20
HLEY	06.96	23	23	18	14	9
HGN	01.56	05	27	21	21	18
FBMD	10.88	43	15	11	8	8
FBP	08.67	29	20	16	20	13
Sanilac	05.54	17	25	19	19	12
Long Black Dessie	22.50	69	7	4	6	-
Bilate 48	18.93	55	12	-	-	-
Bilate 14	18.39	29	20	-	-	-
Bilate 50	22.14	70	6	-	-	-
Triumph of Farcy	07.26	23	23	-	-	-
Tengern 16	33.15	1.04	2	-	-	-
Mexican 142	28.20	85	4	-	-	-

(1) Average of the two Replications

(2) cf Report 1971 Maïs "§ 1.2 selection ear per row".

(3) Ranking without varieties from Bilate 48 to Mexican 142, in order to compare with the results of 1970 and 1969.

4.2 Selection on Satin - P Beans

A Purpose

Satin P is a population of beans including different phenotypes. The observed variability may be explained by possible mixing of varieties 5 to 7 years ago and by natural hybridation.

The purpose of experiment was :

1. To make a visual separation of phenotypes (on seeds)
2. To sow them in very small plots and to observe :
   a) The general behaviour and the genealogic segregation of each type
   b) Their susceptibility to rust
   c) Their cycle
   d) Their yield (first approximation)
   e) The variability of harvested types.

B Selection of Phenotypes (Before sowing - May 1971)

Types	Shape (1)	Size (2)	Type of colour (3)	Basic colour	spots colour	spots shape	Market possibilities
				white yellowish with grey net			Good
S2	SR	StoM	U	Dark purple brown	-	-	Bad
S3	SR	M	U	brown	-	-	Bad
S4	VL	B	M	mixed purple and white	-	-	Rather bad
S5	SR	StoM	S	dark	White	long	Good
S6	SR	"	S	white yellowish	Black	"	Medium
S7	SR	M	S	"	light brown	very long	Medium
S8	SR	StoM	S	cream	Brown	"	Medium
S9	L	B	S	light purple	White	Long	Rather bad
S10	VL	VB	S	" orange	Purple	very long	Rather bad
S11	L	S	S	dark purple	White	Long	Bad
S12	L	B	S	orange	Purple	"	Good
S13	L	B	S	cream	Dark purple	very long	Possible
S14	SR	M	S	dark brown	White	Long	Bad

(1) SR : Sub round; L : Long; VL : very long.
(2) S : Small; M : Medium; L : Long
(3) U : Uniform; M : Mixed; S : spotted.

C Field observation and harvest

At harvesting, 7 varieties were found homogeneous and 7 showed more or less segregation.

Figure 1 : Progeny of all types

Initial type (1)	vegetation Importance	Rust	Cycle (3)	Homogeneity of Harvest	New Phenotypes (4)	Weight of commercial seeds
S1	4.5	3	L	Homo*		195
S2	4.0	4	M	"		85
S3	3.5	5	M	"		85
S4	2.5	1	S	"		103
S5	3.5	5	L	Hetero	S5	0
					S5 B	58
					S5 C	27
S6	3.5	4	L	Hetero	S6	26
					S6 B	26
					S6 C	4
S7	4.0	4	L	Hetero	S7	67
					S7 B	3
S8	3.0	5	M	Homo		46
S9	3.5	1.5	L	Hetro	S9	9
					S9 B	15
					S9 C	79
S 10	4.5	1.5	L	Homo	209	
S 11	3.5	2.0	S	Hetero	S 11	6
					S 11 B	3
					S 11 C	101
S 12	3.0	3.0	S	Hetero	S 12	100
					S 12 B	2
					S 12 C	5
					S 12 D	2
S 13	3.5	0.0	L	Homo		358
S 14	4.0	5	L	Hetero	S 14	1
					S 14 B	20
					S 14 C	44

(1) Initial type at sowing time
(2) Rust : score from 0 to 5 as usual
(3) L : long ; M : Medium ; S : Short
(4) At harvest time

Actually we may split this progency into 2 components S.W. (whitish) and S.y (yellowish)

Figure II : Progeny of main segregating types

Initial type (at sowing)	Description (at sowing)	Harvested types	Description of new types	weight of new types
S 5	dark with white spots	S 5		Ø
		S 5 B	white with dark spots	58
		S 5 C	white with light brown spots	27
S 6	white yellowish with black spots	S 6		26
		S 6 B	yellow orange with light brown spots	26
		S 6 C	Black with white spots	4
S 7	yellow orange with light brown spots	S 7		
		S 7 B	cream uniform bean	3
S 9	Light purple red with white spots			
		S 9 B	white uniform or dark purple spots	15
		S 9 C	white with purple spots	79
S 11	dark purple red with white spots	S 11		
		S 11 B	creamy white uniform or pale purple spots	3
		S 11 C	white with purple spots	101
S 12	orange with purple spots	S 12		100
		S 12 B	cream uniform	2
		S 12 C	purple with white spots	5
		S 12 D	black with white spots	2
S 14	dark brown with white spots	S 14		1
		S 14 B	cream with light brown spots	20
		S 14 C	white with black spots	44

D Some conclusions

1/ The top yielding varieties are those which have the best tolerance to rust.

2/ We may point out the main types having both market possibilities and agronomical qualities : S_{11} S_{12} and mainly S 13.

4.3 Selected yield Trial

After the first selection work undertaken on satin P (cf §2 Beans - Report 1972), several types were identified out of the general population. Some of them were compared in a yield trial in order to know if the performances are different.

A Methodology

Location	:	Head quarter
Lay-out	:	Complete randomized blocks design with 7 replications and 4 varieties
Plot size	:	7 rows of 8 meters - 5 useful rows Total area : 2.80 x 8 = 22.40 m2 Useful area : 2.00 x 8 = 16.00 m2
Spacing	:	40 cm between rows - 25 cm on the row 2 seeds/hole not thinned
Fertilizer	:	Nothing
Seed Dressing	:	Nothing
Weedicide	:	Patoran 50 - 3 kg/ha on whole surface (1.5 kg/ha active mater)
Sowing date	:	August 12
Harvest	:	December 2 S12 - S10 " 13 S5 - S6
Varieties	:	Four types of Satin P : S12 - S10 - S5 - S6.

B Statistical analysis - Results

- Analysis of variance

Blocks Variation	F calcul	0.886
	F tables	2.66
Treatments	F calcul	42.398 S
	F tables	3.16
General average (q/ha)		14.160
Variation coefficient %		13.492
E TM (q/ha)		0.722

- DUNCAN test

Treatments	Yield q/ha	Test
S 10	19.553	a
S 12	16.642	b
S 06	10.419	c
S 05	10.026	c

Conclusion

Big differences in yield are observed among observed types. S 10 is ahead as for the yield is concerned. Nevertheless we have seen that market possibilities for this variety seem limited compared with S 12, S 1 or S 13.

4.4 Multilocal Variety Trial

This trial was carried out by SORADEP and WADU (1) under the leadership of the AWASA Research Station in order to know what are the best adapted varieties in different places of the middle South of Ethiopia.

A Methods

Locations : Head quarter - Shallo - Awassa
Neghelle Arussi — 47 km North of Awassa
Dembere Kella — 40 km South of Awassa
Sinklle — 74 km West of Awassa
Abela (WADU)

Lay-out : Complete randomized blocks design with 6 replications and 5 varieties.

Plot size : 7 rows of 8 meters - 5 useful rows.
Total area : 2.80 x 8 = 22.4 m2
Useful area : 2.00 x 8 = 16.0 m2

Spacing : 40 cm between rows
15 cm on the row for MPBT
25 cm on the row the other varieties
2 seeds/hole not thinned.

Fertilizers : 100 kg/ha before sowing of Triple superphosphate 48%.
100 kg/ha at 1st cultivation of Urea 46%.
No fertilization in SORADEP - trials

Varieties : MPBT - Satin P - FBMD - Black Dessie - Red Wollamo Sodo.
Some more varieties for WADU trials (cf 1 C)

Sowing and Harvesting dates :

Locations	HQ	Sh	Neghelle	Dembere Kella	Sinkille
Sowing date	14 July	26 july	26 July	22 July	24 July
Harvesting	-	-	16 - 24 nov.	15 - 24 nov.	15 - 24 nov

(1) SORADEP : Southern Regional Agricultural Development
WADU : Wollamo Agricultural Development Unit.

B Field observations

Locations / Diseases	Neghelle			Dembere Kella			Sinkille		
Varieties	R	B	A	A	B	A	R	B	A
MPBT	0,5	0.4	0.3	0.4	1,1	1.1	0.5	1.3	0.9
SATIN P	2.8	2.7	1.6	2.1	2.3	2.2	3.1	3.0	2.5
FBMD	4.1	3.4	2.0	2.5	2.8	2.0	3.6	3.8	2.8
B. DESSIE	0.9	3.5	1.8	0.6	3.6	2.4	0.9	3.7	2.8
R. W. SODO	0.4	1.5	0.8	0.2	1.3	1.0	0.6	1.2	1.5

R - Rust ; B - Blight ; A - Anthracnose on pod
Score from 0 to 5 as usual.

C Statistical Analysis - Results

- WADU results

Varieties	Yied q/ha
Mexican	24.17
Red Wolamo Sodo	24.07
Tangeru	22.73
MPBT	20.17
Satin P	17.05
Black Dessie	16.16
Japanese Pink	15.21
FBMD	12.51
Average	19.01
Least significant difference 5%	4.43

- Analysis of variance

Analysis \ Locations		Head quarter	Shallo	Neghelle	Dembere	Sinkille
Blacks Variation	F calcul	2.767 S	2.377	1.975	6.198 S	2.034
	F tables	2.71	2.71	2.71	2.71	2.74
Treatments	F calcul	17.869 S	6.535 S	1.977	13.512 S	26.797 S
	F tables	2.87	2.87	2.87	2.87	2.90
General Average	q/ha	22.793	23.714	17.677	11.406	11.023
Variation Coefficient	%	19.315	22.988	22.384	23.819	12.801
ETM	q/ha	1.797	2.225	1.615	1.109	0.556

- DUNCAN test

	Head Quarter			Shallo		
Varieties	Yield q/ha	Test	Varieties	Yield q/ha	Test
Red W.S.	31.177	a	Red W.S.	32.770	a
MPBT	30.114	a	FBMD	23.427	b
FBMD	19.625	b	Satin P	23.083	b
Satin P	19.562	b	MPBT	22.281	b
B. Dessie	13.489	c	B. Dessie	17.010	b

Conclusion

- Since no fertilization was applied in SORADEP experiment fields (Neghelle, Dembere Kella, Sinklle), yields in those places look definitively lower that those obtained at HQ and Shallo.

- Red W.S. ranks fint at all places. This variety show a low sensibility to main diseases. Its major defect consists in the fact that it is not appreciate for export but finds only local domestic market.

4.5 Multilocal cultural Practice Trial

Like the previous trial, this experiment was carried out in several places in order to know the best date for sowing according to the different areas.

A Methods

Locations : Head quarter
Shallo
Neghelle Arussi
Dembere Kella
Sinklle

Lay-out : Factorial design with 6 replications
2 treatments : 3 sowing dates x 2 varieties

Plot size : 7 rows of 8 meters - 5 useful rows
Total area : 2.80 x 8 = 22.40 m2
Useful area : 2.00 x 8 = 16.00 m2

Spacing : 40 cm between rows
15 cm on the r ow for MPBT
25 cm on the row for Black Dessie
2 seeds/hole not thinned

Fertilizers : 100 kg/ha (before sowing) of triple superphosphate 48%
100 kg/ha (1st cultivation)of urea 46%
(At Head Quarter and Shallo only)

Treatments : Sowing dates : 7 July ; 21 July ; August 4
Varieties : MPBT - Black Dessie

B Agronomical dates

	Head Quarter	Shallo	Neghelle	Dembere	Sinklle
Sowing dates	July 7 July 21 Aug. 4	July 9 July 24 Aug. 7	July 1 July 15 July 30	July 1 July 15 July 30	July 1 July 15 July 30
Fertilization	100 kg/ha TSP 100 kg/ha urea	100 kg/ha TSP 100 kg/ha urea	nothing	nothing	nothing

C Field observations

Locations		Head Quarter			Neghelle		
Diseases	Treatments Varieties	1	2	3	1	2	3
Rust	MPBT	0	2	1.8	2.7	1.3	-
	B. DESSIE	0.5	1.7	2.3	1.8	1.8	1.3
Leaf Blight	MPBT	3.7	3.3	3.0	2.0	0.7	-
	B. Dessie	3.5	3.0	1.5	3.5	2.8	1.4

Locations		Dembere			Sinklle		
Diseases	Treatments / Varieties	1	2	3	1	2	3
Rust	MPBT	1.6	0.7	0.3	2.2	1.1	0.4
	B. Dessie	1.6	1.0	0.3	1.3	1.5	1.4
Anthracnose	MPBT	3.1	2.2	-	2.0	1.0	-
	B. Dessie	3.1	2.2	-	3.0	2.2	-
Leaf Blight	MPBT	3.8	3.0	2.8	2.6	1.7	0.6
	B. Dessie	3.8	3.0	2.8	4.3	3.1	2.3

D - STATISTICAL ANALYSIS

- Analysis of variance (Head quarter-Shallo)

Locations / Analysis Titles		HQ	Shallo
Blocks effect	F calcul	1.576	0.250
	F tables	2.60	2.60
Treatments	F calcul	13.094 S	32.662 S
	F tables	2.60	2.60
Average	q/ha	16.907	23.072
Variation coeff.	%	21.427	19.087
ETM	q/ha	1.479	1.797
Factorial effects			
Sowing date effect	F calcul	7.826 S	3.692 S
	F tables	3.39	3.39
Variety effect	F calcul	25.695 S	152.088 S
	F tables	4.24	4.24
Interaction	F calcul	12.061 S	1.918
	F tables	3.39	3.39

- DUNCAN test (Head Quarter - Shallo)

HEAD QUARTER						SHALLO			
MPBT			B. DESSIE			MPBT and BLACK DESSIE			
Treats.	Yield q/ha	Test	Treats.	Yield q/ha	Test	Dates	Yield q/ha		Test
							MPBT	B Dessie	
July 7	27.229	a	July 21	15.468	a	July 7	33.031	16.479	a
Aug.4	17.718	B	July 7	13.343	a	July 21	35.260	13.125	a
July 21	14.958	b	Aug. 4	12.729	a	Aug.4	28.083	12.458	b

- Analysis of variance (Neghelle - Dembere - Sinklle)

Neghelle results had a variation coefficient far too high (29%) and were not analysed.

Locations / Title		Dembere	Sinklle
Blocks effect	F calcul	1.225	2.608
	F tables	5.05	5.05
Treatments Varieties	F calcul	14.923 S	6.171
	F tables	6.61	6.61
ETM (varieties)	q/ha	0.905	0.391
Treatments sowing dates	F calcul	26.067 S	38.014 S
	F tables	3.49	3.49
Interaction	F calcul	2.029	18.478 S
	F tables	3.49	3.49
general average	q/ha	8.276	9.392
standard deviation	"	2.117	1.383
coefficient variation	%	25.580	14.725
ETM (Sowing dates)		0.611	0.399

- DUNCAN test

DEMBERE				SINKLLE						
Yield q/ha				MPBT				BLACK DESSIE		
Dates			Test	Dates	Yield q/ha		Test	Dates	Yield q/ha	Test
July 1	14.489	8.135	a	July 1	13.031		a	July 1	9.500	a
July 15	9.937	6.937	b	July 15	11.895		a	July 15	8.718	a
July 30	7.822	2.333	c	July 30	5.312		b	July 30	7.895	a

Conclusion

Important effects on the yield were generally observed according the sowing dates, beeing MPBT the most variable.

Almost all early sowing dates (1st July) look higher yielding than later sowing dates for MPBT. Black Dessie 1st sowing date and second look sometimes similarly yielding.

All diseases scores show that there is less development of diseases for late sowing than for earlier ones.

4.6 Phytotoxicity to PATORAN (Mehobromuron)

The aim of this trial was to know the phytotoxicity of Patoran to every plant of the rotation of crops used at Awassa.

A Methods

1. Dosis of Patoran 50 : 0-1-2-4-8 kg/ha commercial with an amount of 800 liters of water per hectare (4 liters/50m2)

2. Treated plants : (40 cm between the rows)

Bean MPBT 25 cm on the row - 2 seeds per hole
Bean Red Wollams Sodo " "
Bean Black Dessie " "
Bean SATIN P " "
Bean HLN " "

Maize Synthetic II on the row - 2 seeds per hole
Rape seed Awassa 1 gram per square meter
Sunflower Russian Black 2 seeds each 25 cm
1 plant each 50 cm

3. For every dosis and every plant, there were a pre-sowing and a post sowing treatment. That means, one sowing at the day D-k, spraying at Day D and second sowing at Day + n.

4 replications.
Spraying date : 07 July 1971

1st sowing date (pre sowing treatment) : 4 July
2d sowing date (post sowing treatment) : few days after 7 July

B Observations

- Beginning September

Dosis / Plants	0	1	2	4	8
Post sowing Maize	0	0	0	0	0
Pré sowing Maize	0	0	0	0	0
Post sowing Pepper	0	0.2	0.5	2.5	4
Pré sowing Pepper	0	0	0.5	1	3.5
Post sowing sunflower	0	0	0	1	3.2
Pré sowing sunflower	0	0	0	1	2.2
Post sowing rape seed	0	4	4	5	5
Pre sowing rape seed	0	3.7	4	5	5
Post sowing MPBT	0	0	0	2	4.2
Pre sowing MPBT	0	0	0	1.5	4.7
Post sowing HLN	0	0	0	1.5	3
Pre sowing HLN	0	0	0.5	1.5	2.7
Post sowing Satin P	0	0	0.5	0	1.7
Pre sowing Satin P	0	0	0	0	2.5
Post sowing Red W.S	0	0.2	0	0	2.2
Pre sowing Red W.S.	0	0	0	0	3.5
Post sowing Black D	0	0	0	0.5	3.2
Pre sowing Black D.	0	0	0	0	4.2

Meaning of the score from 0 to 5 :

0 - No effect at all on the plants
1 - Very few effect
2 - Few effect
3 - Some lethal effect
4 - Important lethal effect
5 - Destruction almost complete

No lethal effect

- 17 th of November

Plants	Dosis	0	1	2	4	8
Post sowing	Maize	0	0	0	0	0,8
Pre sowing	Maize	0	0	0	0.5	1
Post sowing	Pepper	0	0	0	0.3	2
Pre sowing	Pepper	0	0.3	0	1.6	3.3
Post sowing	Sunflower	0	0	0	0.3	2
Pre sowing	Sunflower	0	0	0	0.6	2.6
Post sowing	Rape seed	0	4.6	4.6	5	5
Pre sowing	Rape seed	0	4.2	4.8	4.6	5
Post sowing	MPBT	0	0	0	1.6	4.8
Pre sowing	MPBT	0	0	0	2	5
Post sowing	HLN	0	0	0	0.6	2.6
Pre sowing	HLN	0	0	0	0.6	3
Post sowing	Satin P	0	0	0	0	2
Pre sowing	Satin P	0	0	0	0	2.3
Post sowing	Red W.S.	0	0	0	0	3.3
Pre sowing	Red W.S.	0	0	0	0	3.6
Post sowing	Black D.	0	0	0	0	2.6
Pre sowing	Black D	0	0	0	0	4.3

C Conclusions

1. Up to 2 kg/ha (commercial product), Patoran is not toxic for all the plants of the rotation except Rape seed which does not afford even 1 kg/ha of Patoran (C.P.)

2. At 4 kg/ha (C.P.), Patoran 50 is responsable of light toxicity on Pepper and MPBT beans and very light toxicity on sunflower, Maize and HLN beans. Other varieties of beans are quite tolerant at this rate.

3. At 8 kg/ha (C.P.), the destruction of MPBT beans is complete ; other varieties present also some lethal effect ; Satin P is the most tolerant. Maize gets some injuries but not lethal. Sunflower and pepper present more serious injuries and sometimes lethal effect.

4. The effects are not very different between plots treated before sowing and after sowing. But it seems that for beans, the applications done before sowing, made a little more injuries. For transplanted plants (as pepper), it is the contrary : preplanting application involves less injuries to the crop.

5 - OIL CROPS

5.1 National orientative trial 1970

A Foreward

The aim of these trials, carried out during two years (1969-1970) in several research stations of Ethiopia under the leadership of Awasa, was to know the general adaptation of different species of oil crops through the country.

B Some general observations

Some stations had their trials handicapped for one or another reason :

- Unsufficient knowledge on most suitable sowing dates (MELKA WERER),
- Deficiency in water (ALEMAYA)
- Important hail in Bako and Jimma
- Water logging affecting parts of the field (Debre zeit)
- Frost damages at Holetta and Alemaya
- Limitating nutrient factor at Areka
- Very big storm at Gambela : not any harvest except Sunflower

C Summary of important pest and diseases.

1/ Castorbean

2/ Flax

Places	Pest	Diseases	Pest	Diseases
Abela	Some	Rust and Cercospora (imp)		Powdery mildew (imp.)
Alemaya		Rust (important)		Medium important
Areka	Some	Rust and Cercos.(medium)		
Awasa	Few	Alternaria and Cercospora		Powdery mildew
		Ric (some)		damping off (imp.)
Bako	Medium	Rust - Cercospora (imp.)		
D.Zeit	V. Few	Leaf rust, Alternaria,		Powdery mildew
		Ascochyta (few)		(some important)
Holetta	Few	Few	No	Very few
Jimma				
M.Werer	import. noctuidae (borers et jassids)	Botryotinia ricini	Not observed	Some powdery mildew

3/ Nueg

4/ Rapeseed

Places	Pest	Diseases	Pest	Diseases
Abela	No	Few		Powdery mildew (imp)
Alemaya		Septoria (few)		Alternaria (imp)
Areka		Septoria (some)	some	Alternaria (few)
Awasa		Few (round black spot)	some	Alternaria (few)
Bako	Few	Few	some be borer	Alternaria (few)
D.Zeit	No	Few (powdery mildew) leaf spots.)	Aphids import.	Few (white rust. Alt)
Holetta		Important (round black Spots)	Few	Few (lepidopterae
Jimma	Aphids			
M.Werer	Not observed		V.import (leaf eater) Aphids diamond moth.	Albugo-candida

5/ Safflower

6/ Sunflower

Places	Pest	Diseases	Pest	Diseases
Abela		Ramularia (important		Rust (important)
Alemaya	(import.)	Few	Nc	No
Areka		Ramularia (few) Alternaria		Few (Plasmopara)
Awasa		Ramularia (imp) Alternaria		imp. Septoria
Bako		Medium (Alternaria)		Plasmopara, Puccinia Septoria and Plasmopara (imp.)
D. Zeit		(imp.)Alternaria-Ramula.		Bacter.leafspot-Rust
Holetta		Alternaria (important)		Important (Septoria)
Jinma				
Melha W	Diptera	Few		Few Septoria and Puccinia

D Summary of Vegetative appreciation (end september - begining October)

Places	Very good	Good	Medium	Poor	Very poor
Abela		N	SF CB RS	F	SAF
Alemaya		SF N	CB RS	F SAF	
Areka			F N SAF	SF	RS CB
Awasa		CB	RS SF N	F	
Bako		N SF	SAF CB	RS F	
Debre Zeit	CB	N SF	F SAF	RS	
Holetta		F N	RS CB	SAF	
Melka Werer		SF SAF	F CB	RS	

F = Flax
CB = Castorbean
Saf = Safflower
SF = Sunflower
N = Nueg
RS = Rapeseed

E) Yields

Species	Variety	Sowing Date	A W A S S A Yield (Seeds) 1	2	Oil	R 1
Castor bean	V_1	1	3560	12840	6160	–
		2	–	–		–
	V_2	1	4150	13510	6480	1
		2	–	–		–
Flax	V_1	1	225	640	220	–
		2	–	–		–
	V_2	1	450	1635	570	1
		2	–	–		–
Nuog	V_1	1	260	540	220	5
		2	–	–		–
	V_2	1	220	500	190	–
		2	–	–		–
Rape seed	V_1	1	3420	12130	4190	–
		2	–	–		–
	V_2	1	3520	12740	4590	3
		2	–	–		–
Safflower	V_1	1	200	460	110	6
		2	–	–		–
	V_2	1	110	365	98	–
		2	–	–		–
Sunflower	V_1	1	4200	15600	6030	2
		2	–	–		–
	V_2		3200	11220	3140	–
			–	–		–

Oil: In kg for the 4 replication (average content)

Yield (in gram of seed)

ank	B A K O					D E B R E Z E I T				
	Yield (Seeds)		Oil	Rank		Yield (Seeds)		Oil	Rank	
2	1	2		1	2	1	2		1	2
-	Hail					4210	10380	1980	3	3
-						-	-		-	-
2						5130	9720	1570		
-						-	-		-	-
-	270	810	290	-	-	-	-	-	-	-
-	-	-		-	-	950	2480	870	-	-
4	460	1500	530	5	5	860	2485	870	5	3
-	-	-		-	-	-	-	-	-	-
5	1010	2845	970	3	2	-	-	-	-	-
-	-	-		-	-	750	1930	670	3	1
-	680	2570	370	-	-	-	-	-	-	-
-	-	-		-	-	680	1470	600	-	-
-	550	1825	657	2	3	5685	12190	7200	2	1
-	-	-		-	-	-	-		-	-
3	625	1775	639	-	-	5410	17030	6350	-	-
-	-	-		-	-	-	-		-	-
5	980	2655	630	1	1	2890	10330	2800	-	-
-	-	-		-	-	-	-		-	-
-	510	1710	480	-	-	4530	11865	3200	1	2
-	-	-		-	-	-	-		-	-
3	4015	11575	5720	1	1	6620	22690	3810	1	2
-	-	-		-	-	-	-		-	-
-	3900	14380	1030	-	-	6100	22960	5530	-	-
-	-	-		-	-	-	-		-	-

Rank: 1 - Ranking of each oil crop in the station.
2 - Ranking of the station for the considered oil c

1. Top yielding replication
2. Sum of the 4 replications of the most yielding sowing date.

Species	Variety	Sowing Date	HOLETTA Yield (seeds) 1	HOLETTA Yield (seeds) 2	HOLETTA Oil	HOLETTA Rank 1	HOLETTA Rank 2	JIMMA Yield (seeds) 1	JIMMA Yield (seeds) 2	JIMMA Oil	JIMMA Rank 1	JIMMA Rank 2	MELKA WERER Yield (seeds) 1	MELKA WERER Yield (seeds) 2	MELKA WERER Oil	MELKA WERER Rank 1	MELKA WERER Rank 2
Castor bean	V_1	1		Frost				Wild	Animal				6500	20[illegible]	[illegible]	–	–
		2											–	–		–	–
	V_2	1											7500	20300	[illegible]	2	1
		2											–	–		–	–
Flax	V_1	1	–	–	–	–	–	–	–		–	–	–	–	–	–	–
		2	1635	5120	1790	–	–	180	510	180	–	–	980	2900	[illegible]	–	–
	V_2	1	2700	8190	2870	3	1	350	1110	400	4	6	–	–	[illegible]	–	–
		2	–	–		–	–	–	–		–	–	1270	3180		5	2
Nueg	V_1	1	720	2630	890	4	3	–	–	–	–	–	1660	3780	1385	4	1
		2	–	–		–	–	210	600	200	–	–	–	–		–	–
	V_2	1	329	1110	380	–	–	–	–	–	–	–	1650	3635	[illegible]	–	–
		2	–	–		–	–	300	510	[illegible]	5	5	–	–		–	–
Rape seed	V_1	1	3180	12010	1320	[illegible]	3	1300	3120	1230	3	4	1030	330[illegible]	[illegible]	[illegible]	[illegible]
		2	–	–		–	–	–	–		–	–	–	–	–	–	–
	V_2	1	2950	10550	3800	–	–	1120	3[illegible]	1220	–	–	–	–	–	–	–
		2	–	–		–	–	–	–		–	–	300	1915	[illegible]	–	–
Safflower	V_1	1						–	[illegible]	–	–	–	1595	12355	3335	–	–
		2						1350	1800	1300	2	3	–	–		–	–
	V_2	1			Frost			–	–	–	–	–	[illegible]405	160[illegible]	[illegible]330	3	1
		2						1110	3820	1020	–	–	–	–		–	–
Sunflower	V_1	1	3970	10210	3980	2	6	3[illegible]30	125[illegible]0	[illegible]890	1	5	10000	28700	11[illegible]90	1	1
		2	–	–		–	–	–	–		–	–	–	–		–	–
	V_2	1	3090	10380	3050	–	–	–	–	–	–	–	9900	27[illegible]00	7870	–	–
		2	–	–		–	–	2660	9650	2700	–	–	–	–		–	–

Oil: In kg for the 4 replication (average content)

Yield (in gram of weed)

Rank: 1 – Ranking of each of crop in the station.
2 – Ranking of the station for the considered oil crop.

1. Top yielding replication.
2. Sum of the 4 replications of the most yielding sowing date.

5.2 Rape seed

5.2.1 Rape seed Selection field

A Methods

Lay-out : screening with check-plot ; 4 replications with 200 lines per replication and one check line every four lines

200 lines : each line is sown with seeds coming from one plant choosen in a Rape seed variety usually grown at Awasa farm.

Check : mixing of the above 200 lines

Plot size : 1 line of 5 meters

Spacing : 55 cm between rows

Sowing rate : 4 kg/ha

Sowing date : Rep. I : July 7, Rep.II : July 8
Rep.III : July 12, Rep. IV : July 20

Harvest : Starting on Monday 13-XII

Fertilizers : 50 kg/ha Triple superphosphate at sowing
50 kg/ha Urea at 1st cultivation

B Results

- Three main observations were made on each row : Color of stem, height of plants and cycle.
- But, the first criteria was the weight of seeds per row ; on each replication, the yield of a line was estimated as a percentage of the check lines in order to compare the results with a better accuracy

5.2.2 Brassica Collection

The purpose of this experiment was to test some varicties of Brassica.

A Methods

Lay-out : Testing collection with check plots - 9 varieties and 3 Replications.

Plot size : 4 rows of 8 meters - 2 useful rows of 6 meters.
Total area : 2.4 x 8 = 19.2 m2
Useful area : 1.2 x 6 = 7.2 m2

Spacing : 60 cm between rows

Sowing date : July 10

Germination : Very poor or even germination for 7-8-9 in every replication

Harvest : 10-XI : var. 7-8-9 ;
26-XI : var. 4.5.6 ;
15-XII: var. 2.3. ;
25-XII: var. 1

Fertilizers : 50 kg/ha Triple super phosphate
50 kg/ha urea

Treatments : 1/ Local Awassa S70
2/ Nugget (Brassica Napus)
3/ Tanka (Brassica Napus)
4/ Target (Brnasica Napus)
5/ Polar (Brassica campestris)
6/ Arlo (Brassica campestris)
7/ Crambee (without treatment against xanthomonas)
8/ Crambee (hot water treatment against xanthomonas)
9/ Crambee (dry treatment against xanthomonas)

Check plots : Local Awassa rape seed

Remark : Crambee in Rep.I (plots 7-8-9) was not germinating very poor germination for Rep.II and III.

B Results

Varieties	yield q/ha	yield % check
Check	13.51	-
Local Awasa S 70	13.47	94
Nugget	9.76	68
Tanka	7.91	59
Target	8.05	58
Polar	1.27	10
Arlo	2.80	19
Crambee (7)	1.77	08
Crambee (8)	1.32	06
Crambee (9)	0.90	06

5.2.3 Cultural practice trial

This trial was carried out in order to determine the effect of two cultural practice parameters on the yield (sowing date and spacing).

A Methodology

Location : Shallo field

Lay-out : Factorial 2 x3 design with 8 replications

Plot size : Total 6.4 x 8 = 51.2 m2
Useful area : 4.8 x 6 = 28.8 m2

Fertilizers : 50 kg/ha Triple super phosphate at sowing
50 kg/ha urea at 1st cultivation

Treatments : Spacing : A - 40 cm between rows
B - 80 cm between rows

Sowing dates : 1/ June 22
2/ July 07
3/ July 22

Harvest : 1/ December 11
2/ December 25
3/ January 12

B Statistical analysis - Results

- Average yields (Q/ha)

Spacing \ Sowing dates	June 22	July 07	July 22	Average
40 cm	14.622	17.361	12.365	14.782
80 cm	13.020	16.671	12.374	14.021
Average	13.821	17.016	12.369	14.402

- Analysis of variance

Source of Variation	F calculated	F tables 5%
Blocks	1.860	2.29
Treatments	4.994	2.49

General average	q/ha	14.402
Variation coefficient %		19.301
ETM	q/ha	0.982

- Factorial effects

Treatments	F Calculated	F 5% Tables
Sowing date	11.698 S	3.27
Spacing	0.899	4.12
Interaction	0.337	3.27

- DUNCAN test

Treatments	Yield Q/Ha	Test
July 07	17.016	a
June 22	13.821	b
July 22	12.369	b

5.2.4 Conclusion on the Brassicae

1/ All introduction done at Awasa, (and in Ethiopia as a whole) regarding to Brassicae, have shown little interest : yields look low mainly due to diseases interactions. Nevertheless, few characteristics of some introductions (low size, prolificity, short cycle) may be useful in the long run.

"Awasa variety" is still the most attractive material and justify the selection undertaken in 1971.

This selection will be followed and must carry out such importantiimprovements as :

- more purety of the selected varieties with same cycle for the plants of the same variety
- reduction of the size
- genetical improvement of the selected types

Main selections will be compared within a Rape seed National Trial.

2/ It is confirmed that plant population is not an important factor of the yield. Nonetheless, it is suitable to choose a plant population as low as possible to avoid excess of development in size of the plant and unsuitable correlative lodging.

Date of sowing is a point to take into certain account : late sowing (end of July) carries low yield as a consequence of water deficiency during the last period of growth. Early sowing (middle June) may have also low yield if rains start late ; in that case, infestation of insects may appear and justify one chemical control.

5.3 Sunflower

5.3.1 National yield trial

A Methodology

Lay-out : Complete randomized blocks design with 8 replications and 5 varieties

Plot size : 5 rows of 9 meters - 3 useful rows
Total area : 4 x 9 = 36 m2
Useful area : 2.4 x 9 = 21.6 m2

Spacing : 80 cm between rows
25 cm on the row for varieties 2 ; 3 ; 5
35 cm " " " " " 1 ; 4
2 seeds/hole thinned to one
seeds are dressed with Fernasan D

Fertilizers : 100 kg/ha Triple superphosphate 43 % before sowing
100 kg/ha Urea 46 % at 1st cultivation (applied on Aug. 2)

Sowing date : June 15 - germination : June 22

Treatments : 1/ Pop 158
2/ Hesa
3/ Gris strié
4/ Russian black
5/ Yougoslavian black

B Observations

Treatments	Spacing	Lodging (Nb/plot)	Theorical population/ plot	Lodging %
Pop 158	80 x 35	9.4	75	12
Hesa	80 x 35	11.1	108	10
Gris strié	80 x 25	13.2	108	12
Russian black	80 x 35	5.7	75	0
Yougoslav. black	80 x 25	10.0	108	10

C Statistical Analysis - Results

- Analysis of variance

Blocks variation	F calculated F 5% tables	1.240 2.51
Treatments variation	F calculated F 5% tables	4.758 S 2.78
General average Q/Ha		16.115
Variation coefficient %		13.690
E T M Q/Ha		0.833

- DUNCAN test

Treatments	Yield Q/Ha	Test
Pop 158	18.022	a
Hesa	17.473	a
Russian black	16.679	ab
Yougoslav. black	14.417	bc
Gris strié	13.981	c

D Conclusion

Similarly to previous years trial, pop 158, Hera and Russian Black are the best varieties

For oil extraction, Russian Black remains, by far, the most suitable variety, due to its high oil content.

5.3.2 Sowing date trial

A Methodology

Lay-out : Complete randomized blocks design with 6 replications and 4 treatments

Plot size : 8 rows of 8 meters - 6 useful rows
Total area : 6.4 x 8 = 51.2 m2
Useful area : 4.8 x 8 = 38.4 m2

Spacing : 80 cm between the rows - 30 cm on the row
3 seeds/hole thinned to one

Variety : Russian Black
Seed dressing : Fernasan D

Fertilizers : 100 kg/ha TSP before sowing
125 kg/ha Ammonium sulfate at sowing
125 kg/ha Ammonium sulfate at 1st cultivation

Treatments : Sowing dates : 1/ June 04
2/ June 18
3/ July 02
4/ July 15

B Field observations

Treatments	Attacks of birds (1)	Plasmopara useful plot (2)	Theorical population/ useful plot	Attacks of Plasmopara %
June 04	3.8	00.83	160	0.51
June 18	2.3	01.50	"	0.92
July 02	1.2	24.66	"	15.22
July 15	4.5	19.66	"	12.13

(1) Average percentage of seeds eaten by birds.

(2) Number of plants attacked - Average of 6 useful plots.

C Statistical analysis - Results

- Analysis of variance

Blocks variation	F calculated F 5% tables	2.004 2.96
Treatments varieties	F calculated F 5% tables	10.724 S 3.34
General average	Q/Ha	16.507
Variation coefficient	%	15.345
E T M	Q/Ha	0.991

DUNCAN test

Treatments	Yield Q/Ha	Test
June 18	20.468	a
July 02	16.885	b
June 04	16.206	b
July 15	12.530	c

D Conclusion

Effects of date of sowing confirm results found during the previous year (see p 15 Bis of synthesis report for 1970) : Sowing of the Middle of June shows highest yields.

Rape seed and sunflower have a different response to the variation of the sowing date : this may be due to the fact that no pest is found on sunflower during the period (June - beginning July) previous to the rain (which is the contrary for rape seed) ; sunflower is also more resistant to drought than rape seed, during its first stage of growth.

5.4 Castor bean

5.4.1 Castor bean variety trial

A Methods

Lay out : Complete randomized blocks design with 5 treatments and 5 replications

Plot size : 6 rows of 8 meters - 4 useful rows
Total area : 4.5 x 8 = 36 m2
Useful area : 3.0 x 8 = 24 m2

Spacing : 75 cm between rows - 80 cm on the row
3 seeds/hole thinned to one (var. 2
4 seeds/hole thinned to one (var.1-3-4-5)

Seed dressing : Fernasan D and Agroxan D

Fertilization : 100 kg/ha of triple superphosphate 43 %
100 kg/ha of Urea 46 %

Cultivations : The first one at thinning time (August 10), the second one about 4 to 6 weeks later.

Sowing date : June 17

Germination : June 28

Harvest : Was made in three times : December 9 - January 5 - January 29.

Treatments : 1/ R 63 ; 2/ Hazerra 22 ; 3/ NB 415 ; 4/ M 362 ; 5/ M_4N 69

B Observations and results

Observations / Varieties	Homog. (1)	Size (2)	Fertility (3)	Missing (4)	Cycle (5)	Yield (6)	Oil (7)
R 63	G	2.40	Rather good	1	L	15.7	45.2
Hazerra 22	M	-	weak	0	-	08.9	44.0
N B 415	M	-	weak	0	-	04.4	40.3
M 382	G	1.40	Poor	0	E	04.3	41.5
M_4 N 69	B	-	Poor	13	-	04.8	45.7

1 - Homogeneity : G : good ; M / medium ; B : bad.
2 - Size : Average of 5 replications
3 - Fertility : evaluation according to the numbers of flowers.
4 - Missing count : number of plants missing per useful plot. Average of 5 replications
5 - Cycle : E : early ; M : medium ; L : long
6 - Yield : in quintals per hectar
7 - Oil content as a percentage.

C Conclusion

We have to note that there is no statistical analysis because of a variation coefficient too high : 36.3 %. So, the results can give only general indications.

Like the previous years, R 63 gives a correct yield ; Hazerra 22 is falling down a little bit, but, as we can see, the plants were not so homogeneous. The result of M 382 is surprising either for the height (140 cm instead of 200 cm about last year) or the yield (4 quintals per hectar instead of 11 about).

As to the diseases, all the varieties were attached by cercospora and mainly by rust.

5.4.2 Castor bean variety trial

A Methods

Lay out : This trial was carried out with 4 replications and 12 varieties.

Plot size : Total plot : 6 rows of 8 meters 4.5 x 8 = 36 m2
Useful plot : 4 rows of 8 meters 3.0 x 8 = 24 m2

Seed dressing : Agroxan D

Fertilization : 100 kg/ha Triple superphosphate 43 % before sowing
100 kg/ha Urea 46 % at first cultivation

Sowing date : 30 June

Germination : 13-14 July

Harvest : 10 December - 4 January - 29 January.

B Observations and Results

Observations Varieties	Homog. (1)	Size (2)	Oil (3)	Yield 1971	Yield 1970	Yield 1969	Ranking 1970	Ranking 1971
D 11		-	44.8	5.6	-	-	-	7
D 98		1.10	48.6	3.3	4.01	1.89	10	10
K 6		1.60	39.4	1.3	7.87	7.13	8	11
CST	M	-	45.2	4.2	9.18	-	7	9
Cim N 38	M	-	46.5	9.2	11.16	7.69	6	1
PR - CM		2.10	46.9	8.2	13.94	7.41	2	4
NB - 415	M	-	47.5	9.1	7.05	-	9	2
Alemaya 8		-	45.9	6.3	11.64	10.66	4	6
65-N-38		1.90	46.5	5.6	17.20	4.77	1	7
M 382		1.50	44.4	7.9	11.27	-	5	5
Big speckled		2.70	46.1	8.5	12.46	6.05	3	3
M 319	-	-	-	-				

1 - Homogencity of the plants. G : good M : medium B : bad.
2 - Size : height of the plants. Average of 4 replications.
3 - Oil content as a percentage

C Conclusions

First, it is necessary to note that most of the seeds were not original but coming from increases in Awasa.

We may point out the extreme variability of the results according to the years of growing.

As for the diseases, only K6 was very little attached by Cercos, pora and D 98, Big Speckled appeared less sensitive to rust.

5.4.3 Castor bean sowing date trial

A Methods

Lay out : Factorial design with 4 replications

Treatments : 1st treatment : 2 varieties R 63 and NB 415
2d treatment : 3 sowing dates 17 june ; 1 July ; 16 July

Plot size : 8 rows of 8 meters ; useful plot : 6 rows of 8 meters.
Total area : 6 x 8 = 48 m2
Useful area : 4.5 x 8 = 36 m2

Spacing : R 63 : 75 cm between rows : 80 cm on the row
NB 415 : 75 cm between rows : 50 cm on the row

Fertilization : 100 kg/ha Triple superphosphate before sowing
100 kg/ha urea at first cultivation.

B Observations and results

Observations / Treatments		Homog. (1)	Missing (2)	Size (3)	Oil (4)	Yield (5)
R 63	17 June	G	12	2.30	47.1	16.4
	01 July	G	10	2.20	47.3	13.3
	16 July	G	8	2.20	46.9	9.3
NB 415	17 June	B	11	-	45.1	6.0
	01 July	B	6	-	44.2	4.1
	16 July	B	8	-	45.9	3.6

Note : Very important segregation of NB 415 with general low fertility (field observation)

1 - Homogeneity of the plants : G : good, B : bad
2 - Missing plants per useful plot - Average of the 4 replications
3 - Size : Average height of the plants. No results for NB 415 because too much variability of the numbers.
4 - Oil content as a percentage.
5 - Yield : Quintal per ha.

C Conclusions

Even without any statistical analysis, it is clear that the best sowing date is around or before June 15.

For the oil content, it seems that there is no effect of the sowing date.

6 - PEPPER

6.1 Varieties and yield trials

6.1.1. Hot Pepper Populations Yield Trial (Trial Nb. 2).

A Methods

P 43 and P 44 are local populations widely grown at Awassa farm. They are compared in this trial with 2 selections done within these 2 populations :

- P 43, S 69, S 70
- P 44, S 68, S 69

S 69 and S 70 represent selections carried out in the production fields in 1969 and 1970. Plants were choosen mainly for their apparent resistance to main diseases.

These 4 varieties were compared though Fishers blocks method (8 Rep.).

Elementary plot size was 32,0 m2
Useful plot size 19,2 m2
Spacing : 80 x 40 cm.
Fertilizer : - 100 kg/ha of Triple super phosphate at planting
- 100 kg/ha of Ammonium sulphate at first cultivation.

Sowing date in nursery : 20/4/71
Transplanting date : 21/6/71
First cultivation and Fertilizer : 8/7/71
Second cultivation date : 29/7/71
Harvesting date : 14/2/72

B FIELD DATAS AND COMMENTS

1- 26/8/71, Elementary plot = % of Total plants (800)

2- 29 and 30/11/71, Useful plot only (3 lines of 12 plants). Mosaic attacked plants = % of Total plants (288).

Varieties	Dead	1 None attack	2 Doubtful attack	3 few attack	4 some attack	5 Complete attack
P 43	11.8	4.7	1.3	12.8	32.2	36.9
P 43, S 69,S70	10.3	18.1	7.2	15.0	21.6	27.8
P44	19.0	7.2	2.5	12.5	28.8	30.0
P 44, S 68,S69	14.7	3.1	0.3	9.7	21.6	50.6

Date of spraying : 7/8/71

Fengicide : Folidol E 605

P 43 is a little earlier than P 44

3- The above data permit to point out the following conclusion :

For the early attack of mosaic, P 43, S 69, S 70 seems a little less sensitive than P 43 and P 44, less sensitive than P 44, S 68, S 69. Finally, massal selection do not seem to carry out any significant improvement as far mosaic resistance is concerned.

C HARVEST

The yields obtained were the following ones :
(q/ha of airdried pepper).

N°	Variety	1st grade	1st and 2nd grade
2	P 43, S 69, S 70	19.1	28.9
1	P 43	17.7	28.6
3	P 44	13.3	25.8
4	P 44, S 68, S 69	12.9	23.9

Statistical Data	For 1st Grade	For 1st and 2nd Grade
G.M - Q/Ha	15.8	26.8
V.C. - %	26.9	20.6
M.S. - Q/Ha	1.50	1.95
Statistical results	Variation coefficient is too important	No significant differences between yields

This trial does not actually permit to consider any variety as superior to the 3 others. Nevertheless, as a general rule, conservative massal selections carried out at the production level must be maintained, among the populations cultivated at Awassa, in order to keep seeds only from prolific and strong types looking as free as possible from main diseases.

6.1.2. Hot Pepper Populations variety Trial (Trial N° 3).

A Methods

4 sub-populations of P 43 are compared with CP 44 "Mitmita" 5.28.

CP 44 is a varietal type developed from previous selection within the population 44. W.Y.B. and R are sub-populations of P 43 (see 1969 report P. 154). This Mitmita 5.28 is not a capsicum frutescens type but a capsicum annuum.

These 6 varieties were compared through Fisher Blocks method (6 rep.)

Elementary plot size was 32,0 m2

Useful plot size 19,2 m2

Spacing : 80 x 40 cm.

Fertilizer : - 100 kg/Ha of Triple super phosphate at planting.
- 100 kg/Ha of Ammonium sulfate at first cultivation

Sowing date in Nursery : 20/4/71

Transplanting date : 22/6/71

Harvesting date : 1/2/72

First cultivation and Fertilizer : 8/7/71
Second cultivation date : 29/7/71
Harvesting date : 1/2/72

B FIELD DATAS AND COMMENTS

1. 27/8/71, Elementary Plot = % of Total Plants (600).

Varieties	Dead	Broken	Mosaic (early observation)
C P 44	6.3	5.0	7.7
Mitwita 5 - 28	7.0	3.7	6.2
P 43 W 68	9.5	4.2	25.2
P 43 Y 68	11.8	5.2	18.2
P 43 B 68	6.8	2.2	19.8
P 43 R 68	12.0	8.0	19.0

2. 30/11/71, Useful Plot only (2 lines of 20 plants).
Cercospora attacked plants % of Total planted (240).

Varieties	Dead	1 None attack	2 Doubtful attack	3 Few attack	4 Some attack	5 Important attack	6 Complete attack	+5 +6
C P 44	16.2	40.8	5.0	20.8	0.8	12.1	4.2	17.1
Mitwita 5-28	16.7	12.9	5.4	14.6	4.6	26.2	19.6	50.4
P 43 W 68	21.2	27.5	3.7	18.7	5.8	8.7	14.2	28.7
P 43 Y 68	24.6	36.7	3.3	19.2	4.6	7.9	3.7	16.2
P 43 B 68	29.6	17.1	15.8	12.9	0.8	10.8	12.9	24.5
P 43 R 68	24.2	16.2	4.2	17.1	2.5	12.9	22.9	38.3

3. 30/11 and 2/12/71, Data Plot (2 lines of 20 plants)
Mosaic attacked plants ù of Total Planted (240).

Varieties	Dead	None Attack				Complete Attack
CP 44	16.7	7.9	0.8	21.7	34.2	18.7
Mitwita 5-28	17.1	7.1	3.7	11.2	19.6	41.2
P 43 W 68	17.9	-	-	3.7	26.7	51.7
P 43 Y 68	27.1	5.4	0.4	17.1	16.7	33.3
P 43 B 68	27.5	2.5	0.4	16.7	25.0	27.9
P 43 R 68	22.9	1.2	4.6	13.7	12.1	45.4

4. The above data permit to point out the following conclusions :

There are notable difference between the six varieties about percentage of dead plants with the measure plots and observation dates. 3 varieties (P 43 Y 68 - P 43 B 68 - P 43 R 68) show us about 24 - 30 % of dead plants five months after transplanting.

For the total attack of cercospora (some attack up to complete attack %), 2 varieties may be considered as less sensitive :

CP 44 (52,9%) and P 43 Y 68 (50%). On the other hand, Mitmita 5.28 is the most affected by cercospora followed by P 43 R 68.

For the early attack of mosaic the 4 sub - populations are more sensitive than the 2 other varieties (CP 44 and Mitmita) 18-25 % against 6-7%.

For the total attack of Mosaic CP 44 is the less sensitive variety.

5. Other observations were done. They permit to conclude that 5.28 Mitmita was the variety most resistant to lodging.

As for powdery mildew, it affects strongly Mitmita 5.28, P 43, W 68 and P 43 R 68. Other 3 varieties are far less affected.

C HARVEST

The yields obtained were the following ones :
(Q/Ha of airdried pepper).

n°	Varieties	1st Grade	1st and 2nd Grade
2	Mitwita 5-28	20.23	37.12
1	CP 44	19.55	33.10
5	P 43 B 68	11.76	23.74
6	P 43 R 68	10.49	21.51
3	P 43 W 68	12.22	20.71
4	P 43 Y 68	10.10	19.65

Statistical Data		1st Grade	1st and 2nd Grade
G.M. - Q/Ha		14.06	25.97
V.C. -	%	26.82	18.37
-	Q/Ha	1.538	1.948
Statistical results		Variation coefficient is prohibitive	Significant difference between yields.

Test of DUNCAN (Q/ha)

2 - 37.12
1 - 33.10

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5 - 23.74
6 - 21.52
3 - 20.71
4 - 19-65

D CONCLUSION

The two varieties (Mitmita 5 - 28 and CP 44) are more yielding than the four sub-populations (about 35 against 21 Q/Ha). We may link this performance to the fact that they are also the 2 varieties less affected by mosaic at early stage.

We may point out other main qualities and defects observed in this trial for these two best varieties.

Mitmita 5 - 28

Sensitive to cercospora, some resistance to lodging. Sensitive to powdery mildew.

C. P44

Low sensitivity to cercospora. Late affected by Mosaic, sensible to lodging, low sensitivity to powdery mildew.

6.1.3. 5.21 Hybrids Trial (Trial N° 4)

A Methods

16 hybrid types of pepper(everyone having 5.21 as a female parent) have been selected previously and are compared in this trial under Fisher blocks method (3 Replications).

Elementary plot size	:	24.0 m2 (5 Rows).
Spacing	:	80 x 40 cm.
Useful plot size	:	14.4 m2 (3 Rows).
Fertilizers	:	100 kg/ha of Triple super phosphate at planting 100 kg/ha of Ammonium sulfate at 1st cultivation
Sowing date in nursery	:	21/4/71
Transplanting date	:	28/6/71
Replanting date	:	7/7/71
1st cultivation date	:	15/7/71
2nd cultivation date	:	3/8/71
Harvesting date	:	31/1/72

B Field datas and comments

Mosaic was observed on each entry. Other scoring were done only on mosaic tolerant varieties and few other attractive ones.

1- 9/12/71 Data plot only (2 lines of 15 plants)
general datas : % of total planted (90)

N°	Dead	Lodging	Powdery Mildew	Cercospora (important and complete attack)
H.1	12.2	7.8	10,0	65.5
3	3.3	4.4	3.3	84.5
4	13.3	13.3	7.8	72.3
5	17.8	13.3	7.8	44.4
7	15.6	16.7	8.9	62.2
9	21.1	15.6	16.7	52.2
11	16.7	16.7	11.1	71.1
14	14.4	37.8	11.1	67.8
15	8.9	13.3	11.1	75.5

2- Useful plot (3 lines of 15 plants)
Mosaic attacked plants : % of total planted (135)
November 1971

C Harvest

The yields obtained were the following ones : -
(Q/ha of airdried pepper).

N°	Ranking for Mosaic resistance	Ranking for yield		1st grade	1st and 2nd grade
		1st grade	1 + 2 Grade		
H.1	2	2	3	22.3	27.1
2	8	12	10	13.2	23.0
3	1	1	1	23.9	30.9
4	3	3	2	21.1	28.6
5	5	5	9	16.9	23.5
6	14	13	15	11.0	17.6
7	11	10	13	13.7	19.7
8	7	15	16	10.4	17.4
9	15	6	7	15.6	24.1
10	10	4	6	17.3	24.2
11	6	9	5	13.9	25.1
12	12	14	12	10.9	19.8
13	16	16	14	10.1	18.4
14	8	7	4	15.3	26.0
15	13	8	8	14.6	23.9
16	4	11	11	13.4	20.0

Three replications are not enough to have a statistical analysis But this trial gives us many interesting datas about some hybrids of hot pepper, having 5.21 as a female parent.

1- Different degrees of mosaic (PVY) are observed from types like H_1, H_4, H_5, H_{11}, H_{14}, H_2, and H_{16} which look more sensitive. Other types (H_6, H_7, H_8, H_9, H_{10}, H_{12}, H_{13}, H_{15}) look even more sensitive.

2- Generaly the mosaic resistant types were the most yielding and vice-versa.

3- All hybrid types were moderately attacked by powdery mildew, being H_3 particularly little attacked.

4- Cercospora was severe at the end of the season and affected all entries.

Most noticeable hybrid types were as follows : -

H_3 : Bowl shaped, high yielding with numerous fruits. Shows good tolerance to mosaic (PVY), drought, powdery mildew and lodging. It is sensitive to cercospora.

H_4 : Has more development and moderate sensibility to mosaic.

H_1 : Has a big size and small fruits and it is more sensible than H_3 to mosaic.

6.1.4. Hot pepper Marako Dune Yield Trial (Trial N° 5)

A Methods

4 plants were selected in 1970 among the P 43 W population : these 5 varieties were compared through Fisher blocks method (6 Replications).

Elementary plot	:	32.0 m2 (5 Rows)
Spacing	:	80 x 40 cm
Useful plot size	:	19.2 m2 (3 Rows)
Fertilizers	:	100 kg/ha of Triple super phosphate at planting 100 kg/ha of Ammonium sulfate at 1st cultivation
Sowing date in nursery	:	21/4/71
Transplanting date	:	22/6/71
Replanting date	:	1/7/71
1st cultivation date	:	8/7/71
2nd cultivation date	:	29/7/71
Harvesting date	:	9/2/72

B Field datas and comments

1- 2/9/71 Elementary plot : % of total plants (600)

Varieties	Dead	Broken	Mosaic
P 43. W 68	0.7	3.3	11.8
A.P 43. W 70	1.5	6.2	10.7
B.P 43. W 70	1.7	4.0	8.8
C.P 43. W 70	2.2	3.7	14.5
D.P 43. W 70	3.0	5.0	21.5

2- 7/12/71 Data plot only (2 lines of 20 plants).
Mosaic attacked plants : % of Total plants (240).

Varieties	Dead	1 None Attack	2 Doubtful Attack	3 Few Attack	4 Some Attack	5 Complete Attack
P 43	8.7	6.2	1.2	23.7	39.2	20.8
A.P 43	11.7	3.3	4.2	19.2	26.7	35.0
B.P 43	12.9	1.2	1.7	13.7	32.1	38.7
C.P 43	16.2	0.8	-	20.4	33.7	28.7
D.P 43	17.4	4.6	0.8	17.1	25.4	34.6

Date of spraying : 7/8/71
Fengicide : Folidol E 605

3 General datas

4- The above data permit to point out the following conclusions

For the early attack of mosaic, types A and B of P 43 W 70 seems equivalent to P 43 W 68, types C and D more sensitive.

For the complete attack of mosaic, the four types are more sensitive than the first variety : Massal selection do not seem to carry out any significant improvement as far mosaic resistance for pepper is concerned among this population.

C HARVEST

The yields obtained were the following ones (Q/ha of airdried pepper).

N°	Varieties	1st grade	1st and 2nd grade
3	B.P 43	16.3	40.7
1	P 43	18.8	35.5
5	D.P 43	19.6	33.5
2	A.P 43	13.5	31.0
4	C.P 43	17.2	28.9

Statistical Data		For 1st grade	For 1st and 2nd grade
G.M.	Q/ha	17.1	33.9
V.C.	%	16.3	15.2
M.S.D.	Q/ha	1.14	2.11
Statistical Results Duncan Test		5.19.6 1.18.8 4.17.2 3.16.3 2.13.5	
Varieties under the same bracket do not significantly differ			

This trial does not actually permit to consider any variety as superior P 43 W 68 : nevertheless, it may point out the interest to perform conservative selection of phenotypes among this population. It is also interesting to compare the notation about Powdery Mildew and Cercospora attacks and the yields of each variety (1 : very few attack up to 4 : Very important attack).

N°	Q/ha 1st grade	Powdery Mildew	Cercos-pora	N°	Q/ha 1st and 2nd grade	Powdery Mildew	Cercos-pora
5	19.6	2.83	3.50	3	40.7	3.50	4.00
1	18.8	2.67	4.00	1	35.5	2.67	4.00
4	17.2	3.33	3.67	5	33.5	2.83	3.50
3	16.3	3.50	4.00	2	31.0	3.33	3.50
2	13.5	3.33	3.50	4	28.9	3.33	3.67

The attacks of cercospora are very important (average notation between 3.5 and 4.0) but seem to have no influence about yield. Powdery Mildew, with a less important attack (about 2.50 to 3.50) seems to be depressing 1st grade yields.

6.1.5. Hot pepper variety Trial (Trial n° 6)

A Methods

3 long and big fruit american varieties are compared in this trial, taking as a check one variety of mild - pepper well known as to be resistant to P.V.Y. mosaic (see 1970 Report). These 4 varieties were compared through Fisher blocks method (8 Replications).

Elementary plot	:	32.0 m2 (5 rows)
Spacing	:	80 x 40 cm
Useful plot size	:	19.2 m2 (3 rows)
Fertilizers	:	100 kg/ha of Triple super phosphate at planting 100 kg/ha of Ammonium sulfate at cultivation
Transplanting date	:	28/7/71
1st cultivation date	:	17/8/71
Harvesting date	:	17/2/72

B Field datas and comments

1- 6/12/1971 Attacked plots notation
(from 1 : very few to 4 : important attack).

N°	Varieties	Mosaic	Cercospora	Powdery Mildew	Alternaria
1	5.27	1.38	3.75	3.63	1.00
2	5.14	3.38	3.00	2.63	0.75
3	5.15	3.38	3.00	2.88	0.88
4	5.17	3.50	2.63	2.88	1.00

2- The above data permit to point out the following conclusions

- Alternaria attacks seem to be few for each variety.
- Cercospora and powdery mildew are important, cercospora a little less on 5.17, powdery mildew a little less on 5.14.
- 5.27 alone is theless sensitive to mosaic, the three others showing an important to very important sensitivity.
- 5.27, However resistant to mosaic show bad adaptability (sensitivity to cercospora, powdery mildew, sunscald, few fruits located in a very low position with important rotting, etc...)

C Harvest

The yields obtained were the following ones :
(Q/ha of airdried pepper)

N°	Variety	1st grade	1st and 2nd grade
2	5.14	5.37	9.30
3	5.15	5.20	9.20
4	5.17	4.43	8.33
1	5.27	-	2.40

Statistical data		For 1st grade	For 1st and 2nd grade
G.M.	Q/ha	5.0	7.3
V.C.	%	39.4	23.6
M.S.D.	Q/ha	0.70	0.61
Statistical Results		Variation coefficient	9.30
			9.20
		prohibitif	8.33
DUNCAN test		Trial average very poor	2.40
This trial, with a late transplanting date, has suffered from water dificiency - Varieties under the same bracknet do not significantly differ.			

As we can see, water deficiency was very important and explain the low yield obtained in this trial. (Only 65 days were counted from the transplanting data up to the end of useful water in the soil).

6.1.6. Hot pepper Hybrid Type Trial (Trial n° 7)

A Methods

5 hybrids type (A to E) from 5.17 (N° 1 to 5) and 4 hybrids type (A to D) from 5.15 (n° 6 to 9) were compared to obtain upstanding good coloured fruits.
These 9 varieties were compared through Fisher blocks method (4 Replications).

Elementary plot : 40.0 m2 (5 Rows)
Spacing : 80 x 40 cm
Useful plot : 24.0 m2 (3 Rows)
Fertilizers : 100 kg/ha of Triple super phosphate at planting
100 kg/ha of Ammonium sulfate at cultivation
Transplanting date : 3/7/71
Replanting date : 10/7/71
1st cultivation date : 15/7/71

2nd cultivation date : 16/8/71

Harvesting date : 10/2/72

No treatment.

B Harvest

The yields obtained were the following ones :
(Q/ha of airdried pepper).

N°	Varieties	1st grade	1st and 2nd grade
3	5.17 C	23.6	36.6
1	5.17 A	24.2	36.0
6	5.15 A	16.8	33.2
4	5.17 D	16.0	32.7
5	5.17 E	18.3	32.4
2	5.17 B	16.8	30.7
9	5.15 D	13.6	30.2
7	5.15 B	16.9	28.7
8	5.15 C	15.6	24.0

Though 4 replications are enough to obtain statistical results, we saw generally good yields (between 24 to 36 Q/ha), the five hybrids issued from 5.17 and only 2 issued from 5.15 going up the 30 Q/ha yield. 5.17 C and 5.17 A are specially attractive due to their important 1st grade yields.

7 - VEGETABLES

7.1 Potatoes

7.1.1 Bako potatoes variety trial year 1970

As a result of the crop improvement committee on Potatoes, we introduce from Bako Research Station 10 dutch potato varieties in which various stations have also participated.

Field Operations

Locations	:	Headquarter
Nb. of varieties	:	10
Nb. of Replication	:	4
Elementary plot size	:	6m x 3.25 m
Spacing	:	65cm x 30 cm
Fertilizer 1st application	:	150 kg/ha of 15%, 15%, 15% at planting time
Fertilizer 2nd application	:	150 kg/ha of 15%, 15%, 15% at 1st cultivation
Planting date	:	20/7/70

Observation

1st the time that tubers were sent was not appropriate one.

2nd due to the late arrival of the tubers the site available for planting was poor in drainage.

Eventhough, we faced these problems since we were interested to have the seed stock for further observation trial it was planted.

Pests

No pest was observed.

Disease

2 main diseases have been observed, Alternaria Solani and Phytophthora infestans in which variety Nb. 8 mainly due Phytophthora infestans was completely yield less. (See table 1)

n°	Variety	Sprouting	disease phytophthora	date of emergency	date of harvesting	tuber colour
1	Alpha	20/7/70	very slight	14/8/70	23/12/70	white
2	Multa	"	Important	10/8/70	"	white
3	Arka	"	Slight	14/8/70	"	pink
4	Spartaan	"	Medium	14/8/70	"	white
6	Nascor	"	Important	18/8/70	"	white
7	Ginekei	"	Important	14/8/70	"	pink
8	Bintje	"	Very important	10/8/70	"	white
9	Patrones	"	Slight	14/8/70	"	white
10	Desiree	"	Medium	14/8/70	"	deep red

Observations

1/ Variety Nb. 2,4,7, and 9 were found to yield higher than the average yield of all the varieties while 7 if it is not for its Pinikish colour which at present is not a disrable skin colour by the Public was otherwise the highest yielder. (see table 2).

2/ Storing of the tubers after harvest for longer period of time is presently a problem.

3/ Planting site that was freely available, at the arrival of the seed, was unfortunately water logging, therefore we have observed soil effect on the development of the same varieties.

4/ Fertilizer rate, time of riding were not applied to the best possible especially ridging due to the water logging problem.

TABLE 2

N°	Variety	Total yield in Q/ha	% of Big over 60mm Diameter	% of small less than 30mm Diameter	% of seed (30-60mm)	% of damage (By Tools)	% of disease
1	Alpha	146,230	44.00	20.20	16.60	13.40	5.80
2	Multa	258,538	53.85	20.95	13.10	8.70	3.40
3	Arka	204,897	43.50	20.07	13.01	16.80	5.90
4	Spartaan	235,333	46.20	17.08	27.02	6.50	2.30
6	Nascor	218,410	43.80	17.05	20.06	9.60	8.50
7	Gineka	273,769	53.00	14.40	14.80	9.50	8.30
8	Bintje	No Harvest due to Phytophthora Infestation					100
9	Patrones	233,743	38.00	22.00	23.05	15.50	1.00
10	Desiree	227,769	53.00	19.90	14.09	6.80	5.04

Variance Analysis :

Variation	S Carres	DL.	Variance	F calculé	F 5%
Total	48626218	31	-	-	-
Erreur	5949738.0	21	-	283320.857	-
Blocs	26940100	3	8980033.3	31695 S	3.07
Trait	15736380	7	2248054.3	7934 S	2.49

Moyenne générale : 224.836 q/ha

Coefficient var. : 12.140 S

ETM : 13.648 q/ha

Test de Duncan

7	273.769	a
2	258.538	ab
4	235.333	abc
9	233.743	abc
10	227.769	bc
6	218.410	bc
3	204.897	c
1	146.230	d

7.1.2 Potatoes yield collection trials - year 1971

Objectives

The average yield of Potatoes/ha presently in the country is very low, therefore different varieties of potatoes were under trail for the 2nd year. The clones we have are of Dutch, and local origins. Due to heavy attack by Phytophthora infestions. In 1970 one of the Dutch variety "Bintje" was completely destroyed, therefore this year we have 9 of Dutch and 4 of Local clones these 13 varieties were tested in 2 locations, that is in the main station which has loamy type of soil and at Shallo, with very sandy, pumice type soil. As the treatments were different in the 2 locations, we will present the resultsof the 2 sites separately as Head Quarter and Shallo.

I Potatoes Head Quarter (main station site) Yield trail

A Field Operation

Location : HQ.5 (Headquarter)
N° of varieties : 13
E. plot size : 2.25 x 6 m

N° of Reps	:	4
Spacing	:	30 cm x 65 cm
Fertilizer	:	150 kg of 15-15-15 at planting time 150 kg of 15-15-15- at 1st cultivation
Planting date	:	19/5/71
Date of harvesting	:	(see table 2)

B Observation

In one or more of the 4 Replications, all the varieties have suffered some water logging, other than this, the hail that we had on 29 th June, has damage, certain varieties that showed thin stem, like variety 4,7,9 followed by 6 and 5 (See table 1). Due to the difficulty we faced after harvest with storage facility the clones were over sprouted at time of planting.

Diseases like Phytophthora, Alternaria, Powdery mildew, were found to be variable, from one year to another, depending on climatical condition for example Powdery mildew was not important, in 1970 while Phytophthora was, on the other hand 1971 we found Alternaria and Powdery mildew to be more important, see table 1.

The presence of Phytophthora was masked by the effect of Alternaria.

Aphids, leaf hoppers and catterpillars, were observed and we controlled the catterpillars with Dicarbam 85 % - Aphids and leaf hopper with Dimecron 50.

The catterpillar we found after breeding in our laboratory was identified to be Heliothis armigera.

When observing the homegenity of the vegetation, varieties N° 5,8,9,12 and 13 showed very good standing, followed by 4,6 and 7 as good and N° 1, 3 10 medium while 2 and 11 were found very poor (See Table 2).

TABLE I

N°	Variety	% of Germination	Alternaria	Powdery mildew	Source	Remarks
1	Alfa	39	L	M	Bako Station	Important
2	Multa	7	L	T	" "	"
3	Arka	31	L	T	" "	"
4	Spartaan	49	M	T	" "	"
5	Radosa	58	I	Im	" "	"
6	Gineka	54	M	M	" "	"
7	Nascor	53	I	L	" "	"
8	Kuira	66	I	Im	Kuyera - Sha	Local
9	Patrones	57	I	Im	Bako	Important
10	Desiree	40	I	Im	Bako	"
11	Harrar	14	I	Im	Harrar	
12	Alaba	64	I	Im	Alaba Market	Local
13	Durame	62	I	Im	Alaba Market	Local

Disease : T : Trace
L : Little
M : Medium
I : Important (Date of observation 16/7/71)

Development

1 : Very poor
2 : Poor
3 : Medium
4 : Good
5 : Very good

Tubor colour

W : White
P : Pink

Earliness

L : Late
E : Early
M : Medium
VE : Very Early

(x) Variety 3, 4, 5, 9, 11 and 12 are fairly strong in skin texture and can with stand brusing in handling time, which helps to reduce storage disease, and quality.

TABLE II

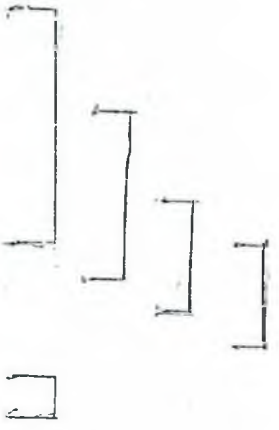
N°	Variety	Vegetative Development	Flowering	Earliness	Tuber Colour	Date of Harvesting
1	Alfa	3		L	W	28/8/71
2	Multa	1		L	W	" "
3	Arka	3		L	P	" "
4	Spartaan	4	X	M	W	" "
5	Radosa	5		E	W	23/8/71
6	Nascor	4		L	W	28/9/71
7	Gineka	5		M-E	P	23/8/71
8	Kuira	5		M	W	28/8/71
9	Patrones	5		M	W	" "
10	Desiree	4	X	L	P	" "
11	Harrar	2		L	W	" "
12	Alaba	4	X	VE	W	16/8/71
13	Durame	5	X	ME	W	23/8/71

Variance analysis

Variation	S.Carres	D.L.	Variance	F calculé	F 5%
totale	701.748	51	-	-	-
erreur	155.069	36	4.307,47	-	-
blocs	31.112	3	10.370,67	2,41	2,85
traitements	515.567	12	42.963,92	9,87 S	2,03

Statistical analysis
(test de Duncan) :

7.	192,95	a
9.	182,05	a
4.	188,97	a
10.	182,31	ab
1.	179,74	ab
8.	176,79	ab
6.	171,54	abc
5.	150,26	abcd
3.	131,03	bcd
13.	120,13	cd
12.	101,54	d
2.	50,38	e
11.	37,95	e



II Potatoes Collection

A Field Operation

Location	:	Shallo
Nb. of varieties	:	9
E. Plot size	:	3 m x 3.25 m
Nb. of Reps	:	2
Spacing	:	30 cm x 65 cm
Fertilizer	:	150 kgs. of 15,15,15, at planting time 150 kgs. of 15,15,15 at 1st cultivation

Planting date : May 26, 1971
Date of harvesting : (See table)

B Observation

Disease

The following varieties wer found attacked by mosaic spartaan in the 2 Reps 29 planted and variety Radosa in the 2 Reps 13 plants, and all were rouged out on 28/6/71.

When observing development and uniformity of the crop, variety 4, 5, 6, showed Heteroginisity, 7, 8, 12, showed very good Homoginity followed by 9, while variety 11 showed very poor germination, variety 4, 9, 4, 11, 10, 12 showed some flowering.

Pests

As few aphids and leaf hopers wer observed, we have sprayed Dimecron 50.

Potatoes yield in Qt/ha (Shallo)

Code N°	Variety	Date of harvesting	Marketable in Qt/ha	Non Marketable in q/ha		Rank
				Mechanical	Diseased	
4	Spartaan	22/9/71	261,0	5.13	4.00	8
5	Radosa	28/8/71	314.2	0	13.34	6
6	Nascor	28/8/71	397.1	4.72	12.98	2
7	Gineka	28/8/71	362.9	13.68	18.26	5
8	Kuyera	22/9/71	422.9	15.697	9.95	1
9	Patrones	28/8/71	385.5	19.19	6.77	3
10	Désirée	28/8/71	379.2	1.54	15.595	4
11	Durame	22/9/71	119.5	0	6.669	9
12	Alaba	28/8/71	304.9	2.975	14.569	7

CONCLUSION

Variety Nb. 7, 10, 12, 5 and 6 showed very high disease tuburs, specially Variety 10 seems to be sensitive on both trail locations i.e. Shallo as well as HQ. ; Kuyera which is local variety is found on both location to be higher yield than the remaining 2 local as well as the Imported varieties. We have found that the potatoes comparatively have been very healthy from Phytophthora, Septoria and Powdery mildew in Shallo than in HQ. except for Mosaic.

With the 2 Replications's yield was doubled at Shallo than in HQ. with the same varieties and more than double with the highest yielder of both sites.

7.2 Cauliflower

Aims

Previous screening works showed that 2 varieties have truly flowered at Awassa condition. Therefore like other vegetable crops, we introduced more varieties to find out other more adaptable varieties.

The collections were planted in different dates, this was only according to the arrival of the seed. As the conditions and field operations were different to certain extent, we have presented the 2 different planting dates separately as 1st planting and 2nd planting dates.

I 1st Planting date

A Field Operation

Location	:	HQ 1
Nb. of varieties	:	2
Nb. of Reps	:	2
E. Plot size	:	5 m x 4 m
Spacing	:	50 cm x 50 cm
Fertilizer	:	200 kgs of 15,15,15,/ha at planting time 200 kgs Ammonium sulphate/ha at 1st cultivation (July 17)
Sowing date	:	April 24, 1971
Transplanting date	:	June 3rd, 1971
Harvesting date	:	31/8/71 - 4/10/71

B Observations

Disease

Xantlomonas campestris was observed in both varieties, and was important, on variety 2 than variety 1 (See yield table) while 2nd more important disease observed this year than previous years was white rust. This disease, attacked variety 1 more than variety 2.

Pests

The important pests we have observed were aphids and some catterpillars, the aphids, as well as the catterpillars were controlled by the application Dimecron 50 and Dicarbam 85%.

Site

The site that was available for planting was importantly water logging. At the time of planting we have watered with water tank. The hail that occured on June 29, has damaged the leaves, apperciably.

YIELD

Sowing date 1 - Cauliflower

Rep.	I				II				Yield in kg/ha			
	Commercial		Non Commercial		Commercial		Non Commercial		Commercial		Non Commercial	
Variety	Nb.of Heads	kg wt	Nb.of Heads	wt	Nb.of Heads	wt	Nb.of Heads	wt	Nb.of Heads	wt	Nb.of Heads	wt
1	34	1828	5	0,72	48	24,5	1	0,28	82	10700	6	425
2	13	618	3	0,96	24	1078	4	3,04	37	4250	7	1000

1/ Phenomenal four months
2/ Deep heart.

II 2nd Planting date

A Field Operation

Location	:	HQ 1
Nb. of varieties	:	10
Nb. of Reps	:	2
E. Plot size	:	3 x 5
Sowing date	:	May 20, 1971
Transplanting date	:	July 1st, 1971
Spacing	:	50 cm x 50 cm
Fertilizer	:	200 kg of 15,15,15 at planting time
Fertilizer	:	200 kg of Ammonium sulphate at 1st cultivation.

Harvesting date : 31/8/71 - 9/10/71. In the second sowing date, varieties n° 3,5, 7,8,9 are comparatively earlier than the other varieties.

B Observations

The sowing date, was very late this was due to the late arrival of the seeds. 2nd water logging was very important.

Disease

Xanthomonas campestris was observed on all varieties, other than this and more important disease we have observed, was Albugo sp. (white rust) this disease attacked variety 6,10 little, variety 2 and 9 medium. Variety 1,3,5,8 . important and variety Nb. 4 and 7 very important.

Pest

Aphids and some catterpillars were important. Even though we have controlled both the catterpillars and Aphids with Dicarbam 85% and Dimecron 50 effectively.

YIELD OF E. PLOT OF II REPS

SOWINC DATE 2

n°	varieties	I				II				Yield in kg/ha	
		Commercial		non Commercial		Commercial		non Commercial		Commercial	non Commercial
		Nb.of Heads	kg vt	Nb.of Heads	wt	Nb.of Heads	wt	Nb.of Heads	wt		
1	CHOU-FLEUR géant primus	61	24.51	30	8.45	50	14.74	24	18.19	8.722.1	5.919.9
2	Extra-hâtif d'Angers	-	-	-	-	-	-	-	-	-	-
3	Merveille de toutes saisons	28	17.87	18	7.95	39	19.72	8	4.07	8.553.2	2.671.1
4	Malmaison	53	20.64	15	7.20	65	24.06	10	7.36	9.933.2	3.235.5
5	d'Erfürt nain très hâtif	34	21.77	3	1.88	26	18.47	5	3.66	8.942.1	1.231.1
6	Géant d'automne	40	15.47	10	6.64	59	25.12	10	6.90	9.019.9	3.008.9
7	Idol	26	14.41	10	2.16	29	19.06	3	0.48	7.437.7	586.7
8	Everest	34	19.49	4	1.17	44	23.64	3	1.45	9.584.3	582.2
9	Le Cerf	33	14.77	24	9.505	35	12.53	18	5.13	6.066.6	3.253.3
10	Hâtif - de Saint Lö	-	-	-	-	-	-	-	-	-	-

CONCLUSION

Though we have presented the 2 sowing dates independently we may conclude, for both in one.

1/ Out of the Total of 12 varieties, 10 have yield more or less while variety 2, and 10 which were of 2nd sowing date. Yielded any.

2/ White rust, was importantly observed, than the previous years, in the cabbages or cauliflowers, while it was a common disease always in the Rape seed grown at Awassa.

3/ Yields that we have obtained this year is better than 1968.

7.3 Peas

Aims

Peas are one of the few crops that have good demand both for local and for export. Previous years trial included few enteries, while this year we have introduced 14 entries.

Field operation

N° of varieties	:	14
N° of Reps	:	2
E. Plot size	:	4 m x 9.50 m
Spacing	:	40cm x 20cm
Fertilizer	:	1st 250 kg of 15-15-15/ha 2nd 200 kg of Ammonium sulfate
Sowing date	:	28/5/71

Observation

1) a/ Pest

- Heliothis armigera and Deudoryx sp were found boring the Pod.

b/ Disease

Leaf and Pod spot and powdery mildew were the 2 main diseases, that we observed among the 2, powdery mildew was common to all varieties while leaf and pod spot was more important on the late varieties.

2) Out of the 14 varieties "Television" was in a spot of water logging. So was seriously affected.

3) Within the 14 varieties we found out that 7 of them were earlier than the other 7 (See yield table).

YIELD TABLE

Variety name	Earliness	YIELD IN Kgs/Ha	
		Marketable	Non marketable
1. Douce Prevence	Early	1681	187.5
2. Cullivert	Late	50	715
3. Juwel (Van Wareren)	Late	107.5	200
4. Lincelin	Late	102.5	323.7
5. Grain ridé Lorka	Early	570	70
6. Merveille de Kelvedon	Early	1257	205
7. Nain très hatif - d'Annonay	Early	2365	306
8. Petit Prevencal	Early	1305	150
9. Plein le panier	Late	602.5	185
10. Relance (Vom Weveren)	Late	305	182.5
11. Serpette nain cent pour un.	Late	22.5	922.5
12. Telévision	Late	160	587.5
13. Grain rond vervil	Early	542.5	97.5
14. Vilnay	Early	625	130

CONCLUSION

a/ We have found out that early groups suffered little leaf and pod spot disease than the late, therefore less non marketable.

b/ The early groups have more or less closer or shorter harvesting time than the late ones.

c/ The early groups have bushy type growth habitate while the late are viening type so needs sticking.