OUTPUT 5
Development of genetic stocks and improved gene pools adapted to the sub-humid environments.

Activity 5.1. Evaluations and selections in the Acid Soils Environment

Activities developed for the acid-soil savannas environment were centralized initially in CORPOICA – La Libertad in Villavicencio, Meta Department. Table 5.1 lists the most relevant trials, whereas the other tables show results specific to each one.

Table 5.1. Trials conducted in the acid-soil savannas environment during the 2003-2004 cycle.

Type of Trial	Location	Genotypes (# plants)	Reps	Observations
Clonal evaluation trial	La Libertad	1071 (7)	3	Tables 5.2-5.4
F1C1 nursery	Santo Tomás	720 (1)	1	-.-
Preliminary yield trial 1 (*CET*-2003)	La Libertad	64 (10)	3	See Table 5.5
Preliminary yield trial 2 (*CET*-2003)	La Libertad	64 (10)	3	See Table 5.6
Preliminary yield trial 3 (*CET*-2003)	La Libertad	64 (10)	3	See Table 5.7
Preliminary yield trial 4 (Diallel-2002)	La Libertad	50 (10)	3	See Table 5.8
Advanced yield trial	La Libertad-L	64 (25)	3	See Table 5.9
Advanced yield trial	La Libertad-L	64 (25)	3	See Table 5.9
Advanced yield trial	La Libertad-P	64 (25)	3	See Table 5.9
Advanced yield trial (old clones)	La Libertad-L	34 (25)	3	See Table 5.10
Advanced yield trial (old clones)	La Libertad-P	34 (25)	3	See Table 5.10
Regional Trial	La Libertad-L	30 (20)	3	See Table 5.11
Regional Trial	La Libertad-P	30 (20)	3	See Table 5.11

To take advantage of the crosses made that resulted in F1 plants grown at Palmira that failed to produce enough stakes to be included in the ***Clonal Evaluation Trial (CET)*** an F1C1 trial was planted. In the case of the Acid Soil Savannas 720 genotypes were in this situation (Table 5.1) and were, therefore, planted in a trial that is actually a multiplication nursery. There is very little selection in these "trial" within the new scheme of selection and evaluation. For the acid soils environment plants that are obviously susceptible to super elongation disease ***(SED)*** or bacterial blight ***(CBB)*** will be eliminated and stakes from them will not be collected.

As mentioned in Output 3 (Table 3.5) a total of 4365 seeds were germinated and 2938 seedlings from these botanical seeds (targeting this particular environment) were transplanted at CIAT-Palmira in an isolated field. The planting of the *F1* stage is isolated to reduce as much as possible infection by diseases that can be found at later stages of the

evaluation process. Seedlings from botanical seed are considered to be disease-free and efforts are made to maintain this condition for as long as it can possibly be done. Enough vegetative cuttings from 1283, 10-months old plants (grouped in 55 families) from the F1 nursery planted the previous year could be obtained and planted in the *CET* for the acid-soils savannas environment (Meta Department) on May, 2004. The trial will be harvested in April-May 2005. In addition a second *CET* trial with 130 clones from the F1C1 was also planted.

Table 5.2. Results from the **Clonal Evaluation Trial** divided into three blocks and conducted in CORPOICA La Libertad (Meta Department). Statistics of the 60 clones selected and all the clones evaluated in each block are presented.

	Plant type (1-5)	Fresh root yield (t/ha)	Foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry root yield (t/ha)	Selection Index
60 selected clones from Block-1							
Maximum	4.00	43.28	43.40	0.62	44.37	16.59	58.95
Minimum	1.00	14.32	17.01	0.40	34.49	6.36	19.56
Average	1.83	28.09	28.36	0.50	39.27	10.99	29.96
St. Deviation	0.85	5.46	6.65	0.05	1.84	1.98	8.07
Performance of the **354** clones evaluated in Block -1							
Maximum	5.00	43.28	45.83	0.62	44.37	16.59	58.95
Minimum	1.00	1.49	6.94	0.15	20.42	0.57	-66.55
Average	3.13	19.92	26.23	0.43	36.88	7.41	0.00
St. Deviation	1.22	6.86	7.51	0.08	3.71	2.78	21.90
60 selected clones from Block-2							
Maximum	5.00	38.89	37.85	0.61	41.81	15.32	57.90
Minimum	1.00	17.74	14.58	0.36	29.94	7.32	21.45
Average	2.00	26.49	25.95	0.51	37.57	9.92	31.07
St. Deviation	0.88	4.93	5.61	0.06	2.71	1.85	8.39
Performance of the **355** clones evaluated in Block -2							
Maximum	5.00	38.89	46.88	0.65	42.00	15.32	57.90
Minimum	1.00	3.13	7.29	0.17	17.90	0.56	-77.29
Average	3.25	18.48	21.74	0.46	33.91	6.35	0.00
St. Deviation	1.21	6.44	6.83	0.09	3.91	2.51	21.71
60 selected clones from Block-3							
Maximum	4.00	35.42	41.32	0.62	39.34	11.32	47.95
Minimum	1.00	16.09	13.89	0.36	29.24	5.67	23.23
Average	2.45	22.79	23.25	0.50	35.19	7.98	30.89
St. Deviation	0.81	4.14	5.46	0.06	2.50	1.34	6.52
Performance of the **361** clones evaluated in Block -3							
Maximum	5.00	35.42	41.32	0.69	39.34	11.32	47.95
Minimum	1.00	0.69	1.74	0.08	18.71	0.13	-73.02
Average	3.48	15.27	19.18	0.44	31.76	4.94	0.03
St. Deviation	1.09	6.02	7.17	0.09	3.60	2.16	22.37

Clonal Evaluation Trials are very large experiments around one hectare in size. A major constraint in their evaluation is the experimental error associated with the unavoidable variation in environmental conditions in such a large experimental plot. Because this is the

first evaluation and selection stage (See Output 3) only 7 stakes are available from each genotype. Replication of each clone, therefore, is difficult to implement. On the other hand clones are grouped in either full- or half-sib families. Since many clones are generally available from each family they are randomly allocated in one of three blocks in which the field is divided. In other words instead of planting all the clones from a given family together one after the other, they are split in three groups, which are planted in the three blocks the entire evaluation is divided into (Figure 4.1).

A summary of the results from the *CET* for the acid soils savannas environment harvested this year is presented in Table 5.2. The 1071 clones included in the *CET* were planted in three blocks with 354, 355 and 361 clones each one, respectively. Checks were also included in each block. Table 5.2 provides information on the averages for each of the three blocks. The variation among these three blocks is an error that eventually affects the selection process. By selecting within each block, however, this environmental effect could be effectively eliminated. Since selection indexes were calculated within each block there is no major variation for this variable across blocks. On the other hand the average fresh root yields were 19.92, 18.48, and 15.27 t/ha respectively for Blocks 1, 2 and 3. This highlights the large environmental variation that is overcome by stratifying the selection within each block.

In Table 5.3 the size (number of clones) and the number of selected clones from each family has been consolidated. This data has been obtained by combining information of the three blocks in which the *CET* was divided into. The average selection index has also been included. The use of selection index has been already described in Output 3.

Family CM 9460 had 12 clones scattered in the three blocks of the *CET* (Table 5.3). Seven of these clones (58%) were selected. The average selection index for this family was 24.99. A family with an average performance would have a selection index around zero. Positive selection indexes mean an average performance better than the mean of the population. A negative selection index suggests a performance below the mean of the population. In the case of family CM 9460, it is obvious that the general performance of that family was outstanding because its selection index (averages across the 12 clones that conformed this family) was 24.99.

Large families such as GM 371 had a high proportion of their clones selected (10 out of 28). At the bottom of the right side of Table 5.3 concentrate the worst performing families. For instance Family SM 3032 had 10 clones scattered in the three blocks of the *CET*. None of these clones was selected. As expected the average selection index for this family was negative (-15.77). A similar situation and perhaps more dramatic is the case of family GM 305, which included 22 clones and none of them was selected. As in the previous case, the selection index for this family was clearly negative (-14.25).

The usefulness of this analysis goes beyond what has been said above about the best and worst families. Detailed information on the averages of the most relevant variables is also available. Therefore, there is information not only about the relative success or failure of each family, but also the reasons why they performed the way the data shows.

Table 5.3. Results from the **Clonal Evaluation Trial** grown in CORPOICA-La Libertad (Meta Department). The results from all the clones from a given family have been grouped. Therefore family data is combined across the three blocks in which the trial was divided into.

Family	Size	# selected clones	Selection Index	Family	Size	# selected clones	Selection Index
CM 9460	12	7	24.99	GM 538	24	4	-1.21
GM 220	13	7	23.25	GM 224	21	3	-1.58
GM 371	28	10	16.27	SM 3029	27	4	-2.47
GM 396	17	5	14.42	SM 3075	27	4	-2.94
GM 507	5	1	13.38	SM 3074	34	6	-3.13
GM 223	23	5	12.34	GM 542	10	1	-3.87
GM 515	24	7	10.62	SM 3077	30	4	-4.53
GM 229	28	8	10.07	SM 3084	20	4	-5.03
SM 2967	15	3	8.55	GM 545	26	0	-5.05
GM 400	24	4	8.03	SM 3073	22	2	-5.26
GM 536	53	12	8.00	GM 275	28	2	-5.50
GM 543	34	8	7.27	SM 2792	28	3	-6.23
GM 221	34	9	7.01	GM 277	31	1	-8.13
SM 3022	16	3	5.81	SM 3083	9	1	-8.36
CM 9942	16	4	5.79	GM 276	39	4	-8.39
GM 512	17	4	4.88	GM 256	19	1	-8.69
GM 514	14	1	4.76	SM 3031	5	0	-8.77
SM 3081	15	4	3.73	SM 3026	24	3	-11.87
GM 241	25	3	3.28	SM 2980	20	2	-12.02
GM 517	25	6	1.35	SM 2634	20	1	-14.06
SM 3069	14	2	1.17	GM 305	22	0	-14.25
SM 3019	13	3	1.10	SM 3076	21	1	-15.20
GM 233	29	7	0.09	SM 3032	10	0	-15.77
CM 9901	14	3	-0.10	**Total**	**1071**	**180**	**-.-**
SM 3068	31	3	-0.68				

The information from Table 5.3 can be further consolidated around the average performance of each progenitor used to generate the *CET*. This is so because each progenitor can be used to produce more than one family. Table 5.4 presents the average performance of the progenies from each progenitor of the clones evaluated in the *CET* this year. The order in this table was based on the proportion of clones from each progenitor that had been selected. Progenies from clone CM 2772-3 (with yellow roots) had an excellent performance with 30 % of them selected and an average selection index of 11.0. It is worth mentioning that progenies from this same clone were the second worst when evaluated in the sub-humid environment (Table 4.4). This highlights the high genotype by environment interactions commonly found in cassava. In other words, cassava clones show in many cases a very specific adaptation to particular environments.

In some cases many progenies from a given progenitor have been evaluated. This is the case of clone SM 1565-15, which was used as one of the progenitors in fourteen full- or half-sib

families. A total of 413 experimental clones evaluated in the *CET* were derived from SM 1565-15 as one of the progenitors. Out of these 413 clones 62 were selected (15%) which is a slightly smaller proportion of selections across the whole experiment (17%). This information, therefore, suggests that the progenies from SM 1565-15 had about an average performance. A statement further supported by the average selection index of these 413 clones of –1. Progenies from MTAI 8 (a clone adapted to the sub-humid environment) and MCOL 2758 were very poor. None of the clones produced by them was selected and they had very negative average selection indexes (-14.2 and -15.8, respectively).

Table 5.4 provides information for the most important characteristics of the progenies from each parent. This information is very closely related to the GCA estimates and reflects the breeding value of each progenitor. This information is very useful for defining the parents to be included in the crossing nurseries in the future.

Table 5.4. Results from all the progenies of a given clone evaluated in the **Clonal Evaluation Trial**. These results give an approximation of the breeding value of each parent involved in this trial.

Progenitor	# Fam.	# clones	Selec. clones	Plant type (1-5)	FRY (t/ha)	FFY (t/ha)	HI (0-1)	DMC (%)	DMY (t/ha)	Sel. Ind.
CM 2772-3	2	44	13	2.6	22.7	22.4	0.49	32.1	7.4	11.0
SM 1862-25	3	73	19	3.2	19.2	21.2	0.48	35.2	6.9	7.2
SM 653-14	1	16	4	3.1	17.4	19.4	0.48	36.0	6.4	5.8
CM 6740-7	6	121	30	3.1	19.1	23.5	0.44	34.9	6.9	4.1
CM 4574-7	9	228	55	2.7	20.5	25.9	0.44	35.4	7.3	10.6
CM 523-7	1	13	3	3.9	19.0	21.7	0.46	34.6	6.6	1.1
SM 1219-9	12	225	51	3.2	20.2	22.5	0.47	34.4	7.1	6.0
SM 1741-1	2	43	8	3.4	16.7	19.4	0.46	35.7	6.1	1.4
CM 2772-3	2	29	5	3.1	18.6	20.9	0.47	35.7	6.7	6.1
SM 1565-15	14	413	62	3.0	16.7	23.0	0.42	34.2	5.8	-1.0
SM 1820-8	1	30	4	3.7	15.8	18.2	0.46	34.4	5.5	-4.5
SM 1779-8	2	38	5	3.9	18.3	22.1	0.44	33.5	6.4	-5.2
MCOL 2737	4	76	10	4.0	17.7	22.7	0.43	34.9	6.3	-4.4
SM 1859-26	3	48	6	2.8	18.4	23.2	0.44	33.7	6.3	3.0
SM 2219-11	6	148	18	3.6	17.0	20.5	0.45	32.5	5.7	-7.2
MBRA 383	1	9	1	4.3	16.5	20.4	0.44	34.6	5.9	-8.4
CM 7033-3	3	55	6	3.1	17.6	22.6	0.43	32.7	5.9	-3.0
HMC 1	2	52	4	3.9	17.1	23.4	0.42	34.9	6.0	-4.9
SM 2058-2	1	28	2	3.2	17.7	24.6	0.42	32.0	5.8	-5.5
CM 6438-14	1	20	1	4.0	15.0	24.4	0.37	34.1	5.3	-14.1
MTAI 8	1	22	0	4.3	14.8	17.4	0.46	32.3	4.8	-14.2
MCOL 2758	1	10	0	4.8	16.8	19.7	0.45	31.6	5.4	-15.8

FRY=Fresh root yield; **FFY**= Fresh Foliage yield; **HI**= Harvest Index; **DMC**= Dry matter content; **DMY**=Dry matter yield; **Sel.Ind**.= Selection Index.

As explained in Output 3 (Figure 3.1) the following step in the selection process is the **Preliminary Yield Trial** *or* **PYT**. Clones evaluated in these trials are those selected during the *CET* conducted the previous year. The seven plants from the *CET* produce more than 30 stakes. Therefore, the *PYT* are planted with three replications of 10-plant plots. Each experimental plot consists of two rows with five plants each. Since selections at the *CET* stage are conducted in there different blocks selections within each block generate a respective *PYT*. The clones allocated to each block at the *CET* (and selected) are therefore, competing among themselves also at the *PYT* phase. The reasons for this are: a) This approach maximized the genetic variability within each *PYT* by maximizing the number of families present in it; b) The performance of the cassava plant depends heavily on the quality of the stake from which it grew, and the quality of the stakes, in turn, depends on the environmental conditions in which the mother plant grew. By keeping together in the same *PYT* trial the clones that grew together at the *CET* a better uniformity of the quality of the stakes is achieved and, therefore, the experimental error at the *PYT* is somewhat reduced.

Table 5.5. Relevant results from the **Preliminary Yield Trial-1** planted in CORPOICA-La Libertad (Villavicencio). Individual performances of the best eight clones (based on selection index) are presented.

Clon	Plant type (1-5)	Fresh root yield (t/ha)	Fresh foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry matter yield (t/ha)	Selection index
CM 9940-2	2.0	37.4	21.4	0.64	33.8	12.6	39.42
SM 2658-26	2.3	29.0	17.8	0.62	35.8	10.4	30.76
CM 9903-59	2.0	25.1	15.4	0.62	33.6	8.4	23.31
GM 276-72	2.3	30.7	22.2	0.58	33.1	10.2	23.14
SM 2642-35	2.0	27.3	25.9	0.51	34.9	9.6	20.99
SM 2968-10	1.7	29.4	18.7	0.61	29.5	8.8	20.08
SM 2977- 6	3.3	31.7	20.2	0.61	33.4	10.6	19.85
CM 6787-15	3.0	29.0	25.3	0.54	34.9	10.1	17.15
Parameters of the 20 clones selected							
Maximum	3.7	37.4	25.9	0.69	37.4	12.6	39.42
Minimum	1.7	14.3	9.6	0.46	29.1	4.9	8.00
Average	2.7	26.1	18.5	0.59	33.7	8.7	16.73
St. Deviation	0.6	5.5	4.2	0.06	2.3	1.7	8.02
Parameters of the 81 clones evaluated							
Maximum	4.5	37.6	27.5	0.75	37.4	13.0	39.42
Minimum	1.7	0.8	0.3	0.45	23.4	0.2	-45.39
Average	3.1	19.4	14.2	0.58	31.6	6.2	0.00
St. Deviation	0.7	8.5	6.4	0.06	3.2	2.9	18.18

PYTs 1 to 3 include clones that were selected during the *CET* harvested in May 2003 and Tables 54.5 to 5.7 provide the most relevant information for *PYTs* 1, 2 and 3, respectively. During the June 2001-May 2002 season a Diallel Study was conducted. That trial was used for generating valuable quantitative genetics information regarding the inheritance of the most relevant traits in cassava. The trial was also used for selection purposes and the best clones from that experiment were included in a *CET* during the June 2002 – May 2003 and the selected clones were grouped for a *PYT* whose results are presented in Table 5.8.

Comparison of the mean performance of each *PYT* trial across Tables 5.5 through 5.7 reveals the kind of environmental variation that can be found, which is effectively controlled by growing three different *PYT* trials. Average fresh root yields were 19,4, 14.80, and 16.05 t/ha respectively for *PYT1, PYT2 and PYT3.*

Clones representing a total of 26 different families were selected from *PYTs* grown this year in the acid-soils environment. One advantage of blocking *CETs* is that no particular family is benefited of affected by particular environmental conditions. This fact is reflected by the number of families that will still be represented at the *AYT* planted for the June 2004-May 2005 season. About 50 families made the *CET* planted two years ago and more than 50% of these families are still represented in the third phase of selection.

Table 5.6. Relevant results from the **Preliminary Yield Trial-2** planted in CORPOICA-La Libertad (Villavicencio). Individual performances of the best eight clones (based on selection index) are presented.

Clon	Plant type (1-5)	Fresh root yield (t/ha)	Fresh foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry matter yield (t/ha)	Selection index
SM 2610-43	2.67	31.34	19.01	0.63	29.14	9.14	38.97
CM 9903-77	2.67	21.27	12.59	0.63	33.91	7.26	34.99
SM 2632-47	3.00	23.61	11.89	0.66	32.64	7.71	34.85
CM 9903-70	3.00	16.49	7.90	0.67	33.91	5.68	27.42
CM 9903-78	2.67	19.88	16.93	0.54	33.32	6.75	23.93
SM 2634-45	2.00	22.66	17.80	0.56	28.78	6.50	23.89
SM 2965-25	3.00	16.06	8.16	0.67	32.76	5.25	23.09
CM 9903-73	3.33	21.01	15.80	0.57	33.32	7.03	21.90
Parameters of the 20 clones selected							
Maximum	3.67	31.34	22.57	0.69	35.89	9.14	38.97
Minimum	2.00	14.32	7.90	0.49	27.92	4.54	9.13
Average	3.10	19.65	13.79	0.59	31.80	6.25	19.54
St. Deviation	0.46	3.92	4.01	0.06	2.03	1.07	8.89
Parameters of the 64 clones evaluated							
Maximum	4.67	31.34	22.57	0.69	35.89	9.14	38.97
Minimum	2.00	3.30	2.69	0.40	19.09	0.86	-52.20
Average	3.47	14.80	10.62	0.58	29.36	4.45	0.00
St. Deviation	0.54	5.80	4.50	0.06	2.90	1.91	20.30

The analysis of the number of clones selected at the *PYTs* this year is interesting and reveals sharp contrasts between different families. While some families represented at the *PYT* did not have any of its clones selected, family CM 9903 had 10 clones selected. Family SM 2965 had five clones selected. Six additional families had three of their clones selected, nine had two and another group of nine families had only one clone selected. The 60 clones selected from the three *PYTs* were planted in the *AYT*.

Table 5.7. Relevant results from the **Preliminary Yield Trial-3** planted in CORPOICA-La Libertad (Villavicencio). Individual performances of the best eight clones (based on selection index) are presented.

Clon	Plant type (1-5)	Fresh root yield (t/ha)	Fresh foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry matter yield (t/ha)	Selection index
SM 2634-65	2.33	26.04	17.45	0.60	35.00	9.12	34.76
CM 9474-42	3.00	30.21	16.67	0.64	32.45	9.79	33.20
CM 9953-74	2.00	24.13	17.01	0.59	33.76	8.12	30.73
SM 2634-61	3.67	32.64	19.10	0.63	32.44	10.47	30.38
SM 2965-29	1.67	22.92	16.32	0.58	33.17	7.60	30.09
SM 2841-15	2.00	20.23	16.32	0.55	34.80	7.10	25.01
CM 6787-39	3.00	27.69	13.45	0.67	28.97	8.02	24.13
SM 2852-5	2.67	23.70	13.72	0.63	31.39	7.45	23.26
Parameters of the 20 clones selected							
Maximum	3.67	32.64	19.10	0.70	35.00	10.47	34.76
Minimum	1.67	14.41	7.20	0.54	27.08	5.03	9.44
Average	2.80	22.53	14.37	0.61	32.05	7.19	20.63
St. Deviation	0.56	4.91	3.22	0.04	2.45	1.48	8.11
Parameters of the 72 clones evaluated							
Maximum	5.00	32.64	22.40	0.70	36.58	10.47	35.89
Minimum	1.67	1.30	0.95	0.41	18.46	0.33	-42.13
Average	3.40	16.05	11.34	0.58	29.94	4.93	0.00
St. Deviation	0.67	7.37	5.28	0.06	3.52	2.44	19.98

Table 5.8. Relevant results from the **Preliminary Yield Trial-4** planted in CORPOICA-La Libertad (Villavicencio) derived from the Diallel study harvested in May 2002. Individual performances of the best eight clones (based on selection index) are presented.

Clon	Plant type (1-5)	Fresh root yield (t/ha)	Fresh foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry matter yield (t/ha)	Selection index
GM 220-16	1.33	29.43	26.22	0.53	34.26	10.07	42.83
CM 9460-3	2.00	30.30	24.13	0.56	33.95	10.30	39.64
GM 221-16	1.67	25.35	29.77	0.46	34.64	8.76	29.85
CM 9460-10	2.33	25.52	21.95	0.54	33.52	8.55	27.19
GM 223-9	1.67	28.91	23.35	0.56	29.21	8.44	26.91
GM 226-14	2.00	20.49	13.89	0.59	32.73	6.77	25.16
CM 9460-9	1.67	21.61	25.52	0.46	34.59	7.46	24.40
GM 240-19	2.00	25.09	16.32	0.60	29.66	7.46	23.67
Parameters of the 20 clones selected							
Maximum	3.00	30.30	29.77	0.60	34.85	10.30	42.83
Minimum	1.33	15.97	13.37	0.46	28.51	5.13	5.52
Average	2.20	22.32	19.65	0.53	32.15	7.18	19.72
St. Deviation	0.44	4.23	4.95	0.04	2.14	1.44	10.40
Parameters of the 50 clones evaluated							
Maximum	4.00	34.29	29.77	0.61	34.85	11.28	39.49
Minimum	1.33	3.13	5.47	0.35	23.68	0.75	-49.35
Average	2.65	17.16	16.10	0.51	30.77	5.40	0.00
St. Deviation	0.57	7.61	6.27	0.06	2.77	2.58	22.13

Table 5.8 provides the results of the *PYT* derived from the diallel study. A total of 50 clones were evaluated and 20 of them selected. They were also included in the *AYT* trial planted this year. The average fresh root yield in this trial was the highest among the *PYTs* with 22.32 t/ha. Six of the 20 clones selected in *PYT-4* came form family CM 9460. Family GM 223 also showed a good performance with three of its clones selected. This trial contributed with clones from 11 families to the *AYT* planted this year.

Clones selected at the *PYTs* are grouped together in an **Advanced Yield Trial** or ***AYT***, which are planted in more than one location and in 20-plant plots (Figure 3.1). During the June 2003 – May 2004 season the *AYT* was planted in three locations and the most relevant results (combined across the three locations) are presented in Table 5.9.

Table 5.9. Across location averages from the **Advanced Yield Trial** planted in three acid soil environments. The trial included 64 genotypes, evaluated in three replications with 20-plant plots. Individual performances of the 10 best clones (based on dry matter yield) are presented.

Clon	Plant type (1-5)	Fresh root yield (t/ha)	Fresh foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry matter yield (t/ha)
CM 9460-13	3.50	44.79	32.75	0.57	35.10	16.09
CM 9463-19	2.83	43.49	36.57	0.54	33.60	14.75
SM 2792-31	1.67	39.09	36.89	0.52	37.26	14.73
SM 2601-44	3.17	40.83	27.26	0.60	35.62	14.70
CM 9460-41	3.00	35.30	32.29	0.52	39.47	14.12
CM 9460- 9	3.33	41.23	24.02	0.63	32.69	13.64
CM 9461- 1	2.83	34.46	24.54	0.58	38.81	13.28
CM 9460-15	2.33	33.77	35.10	0.49	37.59	12.78
CM 9464-29	2.17	34.38	27.26	0.55	36.47	12.55
SM 2640-6	3.17	34.00	31.66	0.52	36.46	12.46
Performance of the four check included in the trial						
CM 6740-7	2.50	47.48	36.52	0.56	35.93	17.17
Brasilera	3.00	35.79	28.18	0.56	34.95	12.49
CM 4574-7	3.33	29.83	23.55	0.52	33.13	10.00
CM 6438-14	2.50	28.10	25.29	0.53	35.34	9.98
Parameters of the 64 clones evaluated (including the four checks)						
Maximum	4.00	49.36	39.58	0.67	40.16	17.87
Minimum	1.67	13.60	12.56	0.40	28.57	4.49
Average	3.02	29.02	25.57	0.53	34.55	10.19
St. Deviation	0.56	7.39	6.51	0.05	2.37	2.80

The first thing to point out about this trial is the outstanding performance of the materials with an average fresh root yield close to 30 t/ha. This resulted in average dry matter yields above 10 t/ha. However, no experimental clone could match the fresh and dry root yields of CM 6740-7 a cultivar that was released by CORPOICA Reina three years ago. Also worth mentioning is the obvious outstanding performance of clones from family CM 9460 which had four representatives among the best ten-performing clones (Table 5.9).

One problem frequently found in the later stages of evaluation and selection of cassava clones is the fact that some genotypes fail to produce convincing evidence of their superiority, which is a requirement for their release as varieties. However, they also fail to produce convincing evidence that they are **not** superior and, because of this, they end up joining a group of clones maintained over the years without any clear action on them. Some times they may be included in some further evaluation trials, which fail to definitely decide what to do with them. During the June 2003-May 2004 season an *AYT* of these "undecided" clones was conducted. Table 5.10 provides the summary of the results from this trial.

Table 5.10. Across location averages from the **Advanced Yield Trial** of "old clones" planted in two acid soil environments. The trial included 64 genotypes, evaluated in three replications with 20-plant plots. Individual performances of the 10 best clones (based on dry matter yield) are presented.

Clon	Plant type (1-5)	Fresh root yield (t/ha)	Fresh foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry matter yield (t/ha)
SM 2219-11	2.8	37.5	27.5	0.58	33.1	12.5
SM 2375-13	2.8	40.2	26.6	0.58	32.8	12.4
CM 7052- 3	2.3	37.8	36.9	0.48	33.2	12.3
SM 2452-6	2.8	32.3	42.2	0.43	35.9	11.9
SM 1812-69	2.5	32.5	25.6	0.56	33.2	10.7
SM 1353-3	4.0	32.0	23.8	0.57	34.2	10.5
SM 1807- 1	2.7	19.8	26.9	0.38	33.5	10.3
CM 6055-3	3.2	30.2	26.4	0.53	35.7	10.2
SM 1881-6	3.3	30.8	32.8	0.48	33.5	9.6
SM 667-1	3.5	27.4	33.7	0.46	32.6	9.0
Performance of the three check included in the trial						
CM 6740-7	2.50	34.75	37.91	0.47	35.77	12.52
CM 4574-7	2.83	25.29	31.39	0.45	33.88	8.62
CM 6438-14	1.92	18.03	22.31	0.34	26.22	6.40
Parameters of the 38 clones evaluated (including the three checks)						
Maximum	4.00	40.16	42.19	0.58	38.04	12.53
Minimum	1.67	8.02	8.16	0.25	16.43	2.77
Average	2.84	25.19	29.72	0.44	33.41	8.28
St. Deviation	0.52	7.87	6.98	0.08	3.56	2.84

In general the mean performance of this trial was excellent with an average of about 25 t/ha of fresh roots. *CORPOICA Reina* (CM 6740-7) was again the best performing check supporting the decision to release this genotype as a variety. Only one clone (SM 2219-11) produced dry matter yield equivalent to that of *Reina* but many were clearly superior to the other two checks.

In spite of the difficulties of experimental clones to yield above *Reina* it should be pointed out that the acid soils environment includes large variation and only a comparison across several locations can eventually determine if the experimental clones are or not superior to *Reina*.

The last step in the evaluation and selection cycle (Figure 3.1) is the *Regional Trial (**RT**).* Results from the *RT* are presented in Table 5.11. The relative performance of the three checks of the *RT* illustrates the need to conduct several trials in different environments to decide, which material is indeed genetically superior. *Brasilera* was much better than *Reina* in the *RT* (Table 5.11) but the opposite was true for the AYT described in Table 5.9. Similarly in the *RT, Reina* yielded less than CM 6438-15, whereas in the *AYT* presented in Table 5.10 it yielded almost twice as much. Several experimental clones in this trial showed average performances superior to the best check (*Brasilera*). During the current period planting material of the genotypes included in the *RT* was increased so that the same trial can be planted in several locations during the June 2004-May 2005 season.

Table 5.11. Across location averages from the **Regional Trial** planted in two acid soil environments. The trial included 30 genotypes, evaluated in three replications with 20-plant plots. Individual performances of the 10 best clones (based on dry matter yield) are presented.

Clon	Plant type (1-5)	Fresh root yield (t/ha)	Fresh foliage yield (t/ha)	Harvest Index (0-1)	Dry matter content (%)	Dry matter yield (t/ha)
SM 2792-31	2.33	47.66	37.93	0.55	36.34	18.03
CM 9464-29	2.83	40.89	41.84	0.48	34.37	15.89
CM 9460-15	2.17	42.88	33.25	0.54	36.07	15.08
SM 2790-18	3.00	35.07	36.11	0.45	36.88	13.59
CM 9460-40	2.83	33.68	28.04	0.52	35.62	13.30
CM 9460-12	2.17	34.24	29.08	0.51	35.13	12.33
SM 2632-4	2.50	37.15	29.51	0.53	34.73	12.14
SM 2636-42	2.17	32.81	37.07	0.46	35.93	11.78
SM 2636-26	2.67	36.37	25.35	0.58	32.73	11.70
CM 9464-30	2.67	29.60	27.34	0.50	36.47	10.77
Performance of the three check included in the trial						
Brasilera	3.33	37.59	25.26	0.58	34.64	13.01
CM 6438-14	2.50	29.69	28.30	0.48	35.09	10.40
CM 6740-7	2.50	28.60	28.82	0.50	34.96	9.11
Parameters of the 30 clones evaluated (including the three checks)						
Maximum	4.00	47.66	43.58	0.66	39.25	18.03
Minimum	1.67	8.33	13.72	0.34	30.04	3.38
Average	2.72	29.97	26.46	0.51	34.78	10.35
St. Deviation	0.56	9.27	7.71	0.07	2.07	3.66