

Tables of results

Table 5.1: Days to physiological maturity, chlorophyll *a* fluorescence, plant height (cm) at topping and number of leaves per plant of the elite breeding lines at the ARC-TCRI in the 1998/1999 season.

Genotype	Days to maturity	Chlorophyll <i>a</i> fluorescence	Plant height at topping	Leaves per plant
ODT82	57	0.76	124.27**	25**
OD486B	58	0.79	112.23	24*
ODT100	56	0.70	119.67**	24*
ODT1	55	0.81	111.80	23
OD1	58	0.73	111.47	23
ODT8	56	0.79	110.47	23
OD313	56	0.77	104.93	22
ODT92	55	0.69	122.20**	22
ODT19	54	0.79	115.03	22
TL33	54	0.79	108.40	22
OD2	55	0.53	122.47**	20
OD490	57	0.78	118.73**	20
F-value (Reps)	*	NS	*	NS
F-value (Gen.)	NS	NS	**	**
LSD (5%)	4.46	0.36	7.53	1.76
LSD (1%)	5.43	0.43	9.15	2.14
CV (%)	3.14	18.84	2.57	3.06

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.2: Lengths, widths and areas of the second-bottom leaves of the elite breeding lines at the ARC-TCRI in 1998/1999 season.

Genotype	Second-leaf length (cm)	Second-leaf width (cm)	Second-leaf area (cm ²)
OD490	62.13**	39.47	1556.13**
OD2	58.67*	37.77	1406.83**
OD486B	56.53	23.07	1250.10**
OD1	59.30*	31.93	1204.60*
ODT1	52.43	27.57	919.67
ODT19	54.53	25.67	893.63
ODT92	57.03	22.20	802.47
OD313	46.57	23.53	694.17
TL33	46.40	23.07	683.03
ODT82	48.00	19.53	603.30
ODT100	47.30	20.00	602.47
ODT8	45.23	18.27	523.27
F-value (Reps)	*	NS	NS
F-value (Gen.)	**	**	**
LSD (5 %)	11.59	17.03	432.25
LSD (1 %)	14.09	20.70	525.55
C.V. (%)	8.61	25.71	18.29

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.3: Lengths, widths and areas of the tenth leaves of the elite breeding lines at the ARC-TCRI in the 1998/1999 season.

Genotype	Tenth-leaf length (cm)	Tenth-leaf width (cm)	Tenth-leaf area (cm ²)
OD2	75.27	39.97*	1909.47*
OD490	75.33	38.80	1856.97
ODT92	76.83	37.73	1838.00
ODT19	73.67	36.77	1725.40
OD1	77.03*	34.33	1676.60
ODT8	68.83	33.17	1448.43
OD486B	71.73	31.57	1443.77
ODT1	68.70	32.63	1425.23
TL33	66.97	30.93	1320.20
ODT100	67.63	30.40	1306.03
ODT82	70.07	26.93	1203.87
OD313	63.30	29.53	1187.10
F-value (Reps)	NS	NS	NS
F-value (Gen.)	*	**	**
LSD (5 %)	10.01	8.58	567.47
LSD (1 %)	14.00	10.43	689.95
C.V. (%)	6.34	10.04	14.58

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)



Table 5.4: Lengths, widths and areas of the eighteenth leaves of the elite breeding lines at the ARC-TCRI in the 1998/1999 season.

Genotype	Eighteenth-leaf length (cm)	Eighteenth-leaf width (cm)	Eighteenth-leaf area (cm ²)
ODT92	73.37*	31.67	1476.60*
ODT19	72.33*	31.40	1449.60
OD1	68.23	32.33*	1407.13
OD2	66.67	32.33*	1379.00
OD490	65.33	32.17	1343.97
ODT82	71.67*	27.97	1281.70
ODT100	71.87*	24.90	1137.27
OD486B	61.13	26.47	1026.87
ODT8	58.90	23.60	884.27
TL33	56.30	23.13	825.47
ODT1	56.13	23.00	820.43
OD313	55.20	22.53	786.70
F-value (Reps)	NS	NS	NS
F-value (Gen.)	**	**	**
LSD (5 %)	15.01	9.07	631.75
LSD (1 %)	18.25	11.83	768.11
C.V. (%)	9.10	13.83	21.54

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.5: Single-leaf areas and whole-plant leaf areas of the elite breeding lines at the ARC-TCRI in the 1998/1999 season.

Genotype	Single-leaf area (cm ²)	Whole-plant leaf area (cm ²)
OD1	1429.43*	33263.11*
OD490	1585.70**	32350.00*
OD2	1565.10**	32025.53
ODT92	1372.37	30652.76
ODT19	1356.20	29841.47
OD486B	1240.27	29296.47
ODT82	1029.63	25502.56
ODT1	1055.20	24698.28
ODT100	1015.27	23894.27
ODT8	952.00	21625.42
TL33	942.90	20408.95
OD313	889.33	20126.96
F-value (Reps)	**	**
F-value (Gen.)	**	**
LSD (5 %)	474.96	11868.09
LSD (1%)	577.48	14429.84
C.V. (%)	15.51	17.28

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.6: Total yield (kg/ha), dip or throwaway mass (percentage of total yield) and marketable yield (kg/ha) of the elite breeding lines at the ARC-TCRI in the 1998/1999 season.

Genotype	Total yield (kg/ha)	Dip mass (% total yield)	Marketable yield (kg/ha)
ODT82	3836.11	6.14	3602.11
OD1	3796.89	12.28	3326.56
OD2	3709.78	11.72	3283.22
ODT92	3384.22	8.42	3104.11
OD490	3288.59	7.00	3059.33
OD313	3168.89	10.67	2829.89
ODT19	3403.33	18.14	2782.89
OD486B	3006.33	10.84	2685.67
ODT1	2914.56	8.04	2669.67
TL33	2986.22	11.13	2666.89
ODT100	3072.11	15.06	2593.11
ODT8	2496.00	17.67	2106.22
F-value (Reps)	NS	NS	NS
F-value (Gen.)	*	NS	*
LSD (5%)	1156.96	12.40	1173.65
LSD (1%)	1406.69	15.08	1426.98
C.V. (%)	13.96	42.62	15.93

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Total yield: Total cured leaf mass, dip (throwaway) mass inclusive

Marketable yield: Total cured leaf mass, dip mass exclusive

Dip mass: Unmarketable throwaway mass

Table 5.7: The correlation of the parameters of field performance of the elite breeding lines and the control, TL33, at the ARC-TCRI in the 1998/1999 season.

Parameters	r-values
Plant height at topping and number of leaves per plant	-0.028
Plant height at topping and whole plant leaf area	0.519*
Plant height at topping and yield	0.569*
Plant height at topping and days to physiological maturity	0.023
Number of leaves per plant and whole-plant leaf area	-0.351
Number of leaves per plant and yield	-0.086
Number of leaves per plant and days to physiological maturity	0.372
Whole-plant leaf area and yield	0.565*
Whole-plant leaf area and days to physiological maturity	0.301
Yield and days to physiological maturity	0.265

* Significant at 0.10 probability level

Table 5.8: The visual evaluation of the elite breeding lines by the representatives of the tobacco industry in the referred 1997/1998 replicated trial at the ARC-TCRI (Scale: 1-5. 1 represents a line that is totally unacceptable. Five represents a perfect line).

Entry	Representatives of the tobacco industry								
	PTK 1	PTK 2	MKTV 1	MKTV 2	MKTV 3	MKTV 4	MKTV 5	Other1	Other2
ODT82	3.33**	2.98	4.58	4.59**	3.67	5.21**	3.67	4.67*	4.07
OD496	3.00*	2.62	4.54	3.67**	3.99	4.61**	4.67**	5.00**	4.96**
OD490	3.33**	2.62	3.85	3.77**	3.71	3.96	4.33**	5.00**	3.99
OD312	3.33**	2.04	4.77*	2.46	3.61	4.57**	3.67	5.00**	4.32
OD2	3.00*	3.01	3.96	3.56*	3.97	3.57	4.00*	4.67*	3.39
ODT101	2.67	2.54	4.10	3.39*	4.00	3.96	4.00*	4.00	3.99
ODT100	2.33	3.04	3.85	3.62**	3.32	3.74	4.00*	4.00	3.66
OD1	2.00	2.39	3.96	3.59*	2.98	3.67	3.67	4.00	4.09
OD489	2.33	2.27	3.31	3.69**	3.38	3.49	3.67	3.67	3.28
ODT9	2.00	2.74	3.57	2.97	2.99	3.33	3.67	3.67	2.28
OD313	2.33	2.74	4.15	2.97	2.67	3.39	3.00	3.67	3.07
ODT107	2.33	1.60	3.46	2.90	3.30	3.28	3.33	4.00	2.93
ODT94	2.00	2.66	4.02	2.38	3.29	3.31	3.00	3.33	2.63
ODT6	2.33	3.13	3.25	3.07	2.34	3.31	3.00	3.33	2.76
ODT22	2.33	2.95	3.27	2.64	2.94	2.71	3.00	3.67	3.30
ODT11	2.00	1.71	3.73	2.18	2.99	2.63	3.33	3.33	3.07
ODT16	2.67	2.70	3.23	2.39	3.35	2.90	3.00	3.67	3.29
ODT95	2.33	2.37	2.84	2.54	2.70	2.76	3.33	3.33	2.70
ODT2	2.33	2.36	3.27	2.23	2.75	3.06	2.67	3.33	3.05
ODT12	2.33	1.56	3.12	1.97	2.06	2.65	3.00	3.67	3.24
ODT8	2.33	2.71	2.92	2.41	2.61	2.40	3.00	3.67	2.60
ODT4	2.00	2.34	3.27	2.64	3.04	2.84	2.00	3.33	2.74
TL33	1.67	2.49	3.39	2.18	2.68	2.87	2.33	3.00	2.86
ODT89	1.67	2.12	2.94	1.95	2.35	2.10	2.67	2.33	2.12
ODT90	2.00	1.64	1.98	1.23	1.32	1.02	1.67	2.67	1.30
Average	2.4	2.49	3.57	2.84	3.04	3.25	3.27	3.76	3.19
F-value (Reps)	**	NS	NS	NS	NS	NS	NS	NS	*
F-value (Gen.)	**	NS	**	**	NS	**	**	**	**
LSD (5%)	1.12	1.55	1.29	1.21	1.96	1.27	1.60	1.53	1.64
LSD (1%)	1.34	1.84	1.54	1.44	2.33	1.51	1.90	1.83	1.96
C.V. (%)	19.5	25.8	15.06	17.70	26.81	16.26	20.37	16.98	21.44

NS Not significant * Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

PTK (Afrikaans) Potgietersrus Tobacco growers' Cooperative

MKTV (Afrikaans) Magaliesburg Tobacco growers' Cooperative

Table 5.9: The cured leaf quality components (expressed as percentages) of the elite breeding lines at the ARC-TCRI in the 1998/1999 season.

Genotype	Quality components					
	Orange	Light orange	Lemon	Closed grain	Bottom leaf	Broken and unmarketable
OD2	0.85	11.06	48.24	4.35	35.50	0.00
OD1	0.00	6.09	67.45	1.59	24.66	0.22
ODT1	0.00	3.28	53.58	6.56	36.58	0.00
OD313	0.00	3.22	62.12	2.06	32.32	0.28
ODT19	0.00	2.60	49.26	9.93	38.21	0.00
ODT100	0.00	2.25	57.10	2.70	32.23	5.72
ODT82	0.00	1.52	71.73	1.32	24.93	0.50
OD486B	0.00	1.10	61.95	5.69	28.60	2.66
OD490	0.00	0.48	69.00	3.69	26.55	0.29
ODT8	0.00	0.00	63.69	1.45	34.56	0.30
ODT92	0.00	0.00	59.40	2.49	38.11	0.00
TL33	0.00	0.00	47.97	7.10	40.70	4.23
F-value (Reps)	NS	NS	NS	**	NS	NS
F-value (Gen.)	NS	NS	NS	NS	NS	NS
LSD (5 %)	1.08	14.38	27.86	13.83	28.92	7.53
LSD (1 %)	1.32	17.49	33.88	16.81	35.16	9.16
C.V. (%)	600.00	214.46	18.45	133.15	34.68	250.15

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.10: The cured leaf quality components (nicotine and reducing-sugar concentrations of the leaf expressed as percentages) of the elite breeding lines at the ARC-TCRI in the 1998/1999 season

Genotype	Nicotine	Reducing sugars
ODT92	2.41	20.28
OD486B	2.52	22.29
ODT8	2.57	17.71
ODT82	2.65	20.77
OD2	2.75	22.68
OD1	2.81	22.44
OD490	3.00	28.90
OD313	3.04	27.31
TL33	3.27	21.76
ODT1	3.29	19.72
ODT100	3.36	20.99
ODT19	3.37	19.55
F-value (Reps)	NS	NS
F-value (Gen.)	NS	**
LSD (5 %)	1.03	7.78
LSD (1 %)	1.26	9.45
C.V. (%)	13.91	13.86

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.11: The grade indices (cents/kg), total income (R/ha) and market income (R/ha) of the elite breeding lines at the ARC-TCRI in the 1998/1999 season.

Genotype	Grade index (cents/kg)	Total income (R/ha)	Market income (R/ha)
ODT82	1756.37	67374.21	63293.50
OD1	1708.53	64970.41	57028.18
OD490	1748.49	57546.99	53564.39
ODT92	1731.54	58427.26	53529.81
OD2	1572.61	58664.61	52020.53
OD313	1698.49	53858.05	48068.26
ODT100	1653.53	50479.21	42847.01
ODT19	1528.67	51815.30	42549.52
OD486B	1565.70	47133.76	42160.68
ODT1	1575.23	45436.04	41880.97
TL33	1572.88	46877.96	41833.98
ODT8	1697.39	42517.54	35856.95
F-value (Reps)	**	NS	NS
F-value (Gen.)	NS	*	*
LSD (5 %)	255.29	22858.16	23213.99
LSD (1 %)	310.39	27792.15	28224.78
C.V. (%)	6.07	16.70	19.04

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Total income = Total yield (dip mass inclusive) x Average grade index

Market income = Total yield (dip mass exclusive) x Average grade index

Average grade index is the average price per kilogram of cured leaf

Table 5.12: The mean yield (kg/ha), quality (cents/kg) and income (Rands/ha) of the elite breeding lines at all the four localities in the 1998/1999 season.

Entry	Sites											
	Groblersdal			Potgietersrus			Rustenburg			Vaalwater		
	Yield	Quality	Income	Yield	Quality	Income	Yield	Quality	Income	Yield	Quality	Income
ODT82	3571.56	1666.60	59209.26	2032.56	1585.14	32223.60	3602.11	1756.37	63293.50	2287.56	1330.14	30297.77
ODT92	3293.67	1279.11	41883.11	2246.33	1673.05	37443.44	3104.11	1731.54	53529.81	2972.89	1375.40	41447.00
OD2	3306.00	1416.66	46997.42	1928.22	1284.78	24856.15	3283.22	1572.61	52020.53	2787.78	1395.74	39527.02
OD1	2998.00	1495.91	45106.04	1701.89	1244.22	21477.26	3326.56	1708.53	57028.18	2401.67	1242.83	30310.10
OD490	2748.44	1547.54	41465.55	1896.11	1390.87	26362.45	3059.33	1748.49	53564.39	1740.44	1512.41	26613.48
OD313	3108.78	1472.20	46153.71	1593.78	1432.48	23053.09	2829.89	1698.49	48068.26	2193.33	1433.66	30711.00
ODT1	3012.56	1233.67	37264.99	1681.11	1421.52	24014.21	2669.67	1575.23	41880.97	2192.00	1424.26	31599.72
ODT19	2657.56	1421.24	37632.52	1448.11	1455.59	21208.45	2782.89	1528.67	42549.52	2227.33	1342.49	30114.67
TL33	2494.00	1559.97	38460.34	1814.56	1633.17	29511.94	2666.89	1572.88	41833.98	1594.00	1121.89	18616.08
OD486B	2127.11	1476.96	30337.11	1131.56	1520.20	17294.70	2685.67	1565.70	42160.68	3013.11	1235.27	36672.81
ODT100	2418.11	1442.50	34624.21	2171.89	1457.29	31640.90	2593.11	1653.53	42847.01	1065.67	1208.59	12694.82
ODT8	2243.89	1436.33	30271.91	1551.22	1591.77	25408.48	2106.22	1697.39	35856.95	2173.11	1235.50	27486.07
F-value (Rep)	*	NS	NS	NS	NS	NS	NS	**	NS	NS	NS	NS
F-value (Entry)	NS	NS	NS	NS	NS	NS	*	NS	*	NS	NS	NS
LSD 5%	1671.58	450.53	26333.70	1285.49	403.71	20370.38	1173.65	255.29	23213.99	2204.15	441.21	32234.50
LSD 1%	2032.39	547.78	32017.89	1562.96	490.85	24767.37	1426.98	310.39	28224.78	2679.92	536.45	39192.39
CV %	23.18	12.17	25.36	28.58	10.75	30.52	15.93	6.07	19.04	38.98	13.11	42.66

NS Not significant * Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.13: The mean marketable yield, quality and market income from the AGROBASE combined analysis of variance for the data from the four localities in the 1998/1999 season.

Entry	Yield (kg/ha)	Quality (cents/kg)	Income (R/ha)
ODT82	2873.44**	1584.56	46256.03**
ODT92	2904.25**	1514.78	43575.84**
OD2	2826.31**	1417.45	40850.28*
OD1	2607.03*	1422.87	38480.39
OD490	2361.08	1549.83	37001.47
OD313	2431.44	1509.21	36996.51
ODT1	2388.84	1413.67	33689.97
ODT19	2278.97	1437.00	32876.29
TL33	2142.36	1471.98	32105.58
OD486B	2239.36	1449.53	31616.33
ODT100	2062.20	1440.48	30451.74
ODT8	2018.61	1490.25	29755.85
Mean	2427.82	1475.13	36138.02
F-value (Locality)	**	**	**
F-value (Entry)	**	NS	**
F-value (Locality x Entry)	NS	NS	NS
LSD (5%)	454.23	113.08	6989.38
LSD (1%)	647.13	161.10	9957.46
CV (%)	27.59	11.30	28.52

NS Not significant

* Significant differences (0.05 probability level)

** Highly significant differences (0.01 probability level)

Table 5.14: The combined analysis of variance for marketable yield data from the four localities in the 1998/1999 season–AMMI model.

Source	df	SS	MS	F	P>F
Total	143	89925472	628849		
Treatment	47	56857929	1209743	3.883	0.0000**
Locality	3	32617348	10872449	34.896	0.0000**
Block	8	5649642	706205	2.267	0.0297*
Genotype	11	14973478	1361225	4.369	0.0000**
Interaction	33	9267103	280821	0.901	0.6223
IPCA	13	5768534	443733	1.424	0.1644
Residual	20	3498570	174928	0.561	0.9286
Error	88	27417901	311567		

Noise is 6.2% of the treatment sum of squares

* Significant differences

** Highly significant differences

Table 5.15: The combined analysis of variance for market income data from the four localities in the 1998/1999 season–AMMI model

Source	Df	SS	MS	F	P>F
Total	143	275157899	1924181		
Treatment	47	187587082	3991215	4.504	0.0000**
Locality	3	113712383	37904128	42.777	0.0000**
Block	8	9594317	1199290	1.353	0.2283
Genotype	11	42653108	3877555	4.376	0.0000**
Interaction	33	31221591	946109	1.068	0.3932
IPCA	13	14990615	1153124	1.301	0.2275
Residual	20	16230975	811549	0.916	0.5688
Error	88	77976500	886097		

Noise is 8.7% of the treatment sum of squares

* Significant differences

** Highly significant differences