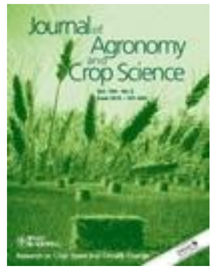

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Assessment of groundnut under combined heat and drought stress

F Hamidou[1], O Halilou[1] & V Vadez[3]

1 International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Sahelian Center, BP 12404, Niamey, Niger

2 Department of Biology, Faculty of Sciences, University Abdou Moumouni, PO Box 10662, Niamey, Niger

3 International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Greater Hyderabad 502 324, AP, India

Keywords

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Correspondence

V. Vadez

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT),

Patancheru, Greater Hyderabad 502 324,

Andhra Pradesh, India

Tel.: +91 40 3071 3463

fax: +91 40 4071 3074

E-mail: v.vadez@cgiar.org

Abstract

In semi arid regions, particularly in the Sahel, water and high temperature stress are serious constraints for groundnut production. Understanding of combined effects of heat and drought on physiological traits, yield and its attributes is of special significance for improving groundnut productivity. Two hundred sixty eight (268) groundnut genotypes were evaluated in four trials under both intermittent drought and fully irrigated conditions, two of the trial being exposed to moderate temperature while the two other trials were exposed to high temperature. The objectives were to analyze the component of the genetic variance and their interactions with water treatment, year and environment (temperature) for agronomic characteristics, to select genotypes with high pod yield under hot and moderate temperature conditions, or both, and to identify traits conferring heat and/or drought tolerance. Strong effects of water treatment (Trt), genotype (G) and genotype by treatment (GxTrt) interaction were observed for pod yield (Py), haulm yield (Hy) and harvest index (HI). The pod yield decrease due to drought stress was 72% at high temperature and 55% at moderate temperature. Pod yield under well-watered (WW) conditions did not decrease under high temperature conditions. Haulm yield decrease due to water stress (WS) was 34% at high temperature and 42% under moderate temperature. Haulm yield tended to increase under high temperature, especially in one season. A significant year effect and genotype by environment interaction (GxE) effect were also observed for the three traits under WW and WS treatments. The GGE biplots confirmed these large interactions and indicated that high yielding genotypes under moderate temperature were different to those at high temperature. However, several genotypes with relatively high yield across years and temperature environments could be identified under both WW and WS conditions. Correlation analysis between pod weight and traits measured during plant growth showed that the partition rate, i.e. the proportion of dry matter partitioned into pods, was contributing in heat and drought tolerance and could be a reliable selection criterion for groundnut breeding program. Groundnut sensitivity to high temperature stress was in part related to the sensitivity of reproduction.

Introduction

About 90% of the world's groundnut production occurs in the tropical and semi-arid tropical regions. Much of the world's groundnut production regions are characterized by high temperature and low or erratic rainfall. Groundnut is sensitive to temperature (Vara Prasad et al. 1999) with an optimum for most processes being between 27 and 30 °C (Ntare et al. 1998), while drought is estimated to cause millions in revenue losses to crop production (Sharma and Lavanya, 2002). Thus, heat and water stress occurring simultaneously are considered to be two major environmental factors limiting groundnut growth and yield.

Plant responses to high temperature vary with plant species and phenological stages (Wahid et al. 2007). Reproductive processes are markedly affected by high temperatures in most plants, which leads to reduced crop yield. For example, both grain weight and grain number appeared to be sensitive to high temperature stress in wheat, as the number of grains per head at maturity declined with increasing temperature (Ferris et al. 1998). Prasad et al. (2000b) investigated the effects of daytime soil and air temperature of 28 and 38^{o}C, from start of flowering to maturity of groundnut, and reported 50% reduction in pod yield at high temperatures. These authors observed that day temperature above 34^{o}C decreased fruit-set and resulted in fewer numbers of pods. However, Greenberg et al. (1992) and Ndunguru et al. (1995) reported that varieties grown by farmers in the

Sahel yielded well in the hot months prior to the onset of the rains and this has been attributed to their ability to maintain partitioning to pods above that in normal temperatures. Here, we test the range of genotypic variation in pod yield under hot conditions, using a large and representative set of genotypes.

Although, under field conditions drought stress is often associated with high temperature stress in the Sahel, the impacts of drought and high temperature stress on groundnut productivity have mostly been studied independently. Ntare et al. (1998) reported that temperature tolerance is an important component of drought resistance and a necessary attribute for varieties destined for the Sahel. This is because large gaps in the rains that cause drought are also paralleled by period of temperature increase. Moreover, authors showed that heat tolerance results in improved photosynthesis, assimilate partitioning, water and nutrient use efficiency, and membrane stability (Camejo et al. 2005; Ahn and Zimmerman, 2006; Momcilovic and Ristic, 2007). There exists a strong relationship between the plant water status and temperature, thus making it very difficult to separate the contributions of heat and drought stress under field conditions (Prasad et al. 2008). Understanding of combined effects of heat and drought on physiological traits, yield and its attributes is of special significance for groundnut breeding program in order to improve productivity and to predict the consequences of climate change on groundnut production in the Sahel.

The working hypothesis of this work is that drought and heat tolerance involve in part independent processes and the ultimate goal was to identify genotypes with specific or combined tolerance to drought and heat. This was achieved by assessing a large and diverse set of groundnut genotypes in two seasons characterized by large differences in temperature during the reproductive phase, and in which different water regimes (intermittent drought and full irrigation) were imposed. Specifically, the study aimed at (1) identifying the component of the genetic variance and their interactions with water treatment, year, and season (temperature) for agronomic characteristics, (2) selecting genotypes with high pod yield under hot and moderate conditions, or both and (3) identifying traits conferring heat and/or drought tolerance.

Material and Methods

Experimental conditions

Four experiments were conducted, two during the rainy seasons 2008 and 2009 characterized by moderate temperatures (MT08 and MT09) (between August and December), and two during the summer seasons 2009 and 2010 characterized by high temperature (HT09 and HT10) (between February and June) in the field at the ICRISAT Sahelian Centre (ISC) in Sadore, Niger, 45 km south of Niamey, 13° N, 2° E. The soils at ISC are arenosols (World Reference Base) with low pH, a very low water holding capacity, low inherent soil fertility and organic matter content. The moderate temperature experiments have been reported in part in Hamidou et al. (as ISC08 and ISC09, under review) and are used here to test the genotypic and genotype-by-environment interactions with the high temperature trials.

In all experiments, fertilizer NPK (15-15-15) and farm yard manure (200 kg ha^{-1}) were incorporated; the field was plowed and irrigated twice before sowing. The experiments were kept disease and insect free all throughout by regular checking and sprays if needed. Hand weeding was done between 30 and 50 DAS. Two hundred sixty eight (268) genotypes, including 259 entries of the groundnut reference collection, were evaluated. The experimental design was an incomplete randomized block design with water treatment as main factor and genotypes as sub-factor randomized within each factor and replicated five times. Each plot ($2m^2$) contained 2 rows (2m each), with a 50cm distance between rows, and 10 cm spacing between plants per row. Plants were irrigated twice a week with 20 mm of water using a linear movement system (Valley Irrigation Inc) until drought stress imposition. Calcium-ammonium-nitrate (200 kg ha^{-1}) and gypsum (200 kg ha^{-1}) were applied during pod formation.

Management of irrigation

All plots were irrigated with 20mm twice a week until flowering (30-35 days after sowing). From that time, half of the plots were exposed to intermittent stress until maturity. The drought stress was imposed by irrigating water stress (WS) plots only once in two times that the well-watered (WW) plots were irrigated. Thus, 40 mm were provided for irrigating all plots (WW and WS) at the time of flowering. The next irrigation was supplied to the WW plots only, based on the estimated evapotranspiration. The next irrigation was supplied to all plots (both WW and WS) and the decision to irrigate was based on a leaf wilting assessment of the WS plots, irrigation being supplied when the wilting score of the WS plots reached a value of 3. The scoring of wilting symptoms was recorded early afternoon as follows: score 1 = no wilting symptoms, score 2 = few leaves wilted in a minority of plants from the plot, score 3 = a majority of plants in a plot have wilted leaves, but none has reached permanent wilting, score 4 = a minority of plants show at least partial symptoms of permanent wilting and score 5 = most plants show symptoms of permanent wilting. Dry-down assessment under controlled imposition of water stress show a score of 3 is reached when the transpiration of the water stress plants is about 40-50% of the transpiration of the well-watered (WW) plants, indicative of a substantial stress, yet not too severe (Ratnakumar et al. 2009; Bhatnagar-Mathur et al. 2007). All irrigation provided 40 mm, so that following this irrigation scheme, the irrigation of WS plots was half of that in the WW plots.

Measurements

During the crop growing period, soil temperature at 5 and 10cm at the hottest period of the day, the maximum (Max) and minimum (Min) air temperatures and the relative humidity were recorded daily from a meteorological station located close to the experimental field. The soil in which soil temperatures were measured was covered by vegetation in the moderate temperature season but this vegetation had dried in the high temperature season. The air temperature and relative humidity were used to determine the vapor pressure deficit (VPD) (Prenger and Ling, 2001).

Time of emergence and time to flowering (50% of the plants started flowering) were recorded before water stress imposition. The SPAD chlorophyll meter reading (SCMR) was measured using a Minolta SPAD-502 meter (Tokyo, Japan) in the MT09 and HT10 experiments during water stress period. Time to maturity and time to harvest were recorded. To record the maturity date, border plants were randomly picked, pods number was counted and the internal pod wall was examined. Mature pods were characterized by the blackening of the internal pod wall. At harvest, the entire two rows per plot were sampled (2.0 m^2). The plants were air-dried for one week before pods were separated from the haulms along with some roots that came up with the pods on lifting. For each plot, haulm weight and pod weight were recorded. Crop growth rate (CGR, kg ha^{-1} per day), pod growth rate (PGR, kg ha^{-1} per day) and partitioning (P, proportion of dry matter partitioned into pods) were estimated following a modified procedure from Williams and Saxena (1991):

$CGR = (Hwt + (Pwt \times 1.65))/T_2)$, $PGR = (Pwt \times 1.65)/(T_2\text{-}T_1\text{-}15)$, $P = R/C$

Where T_2 is the number of days from sowing to harvest, T_1 is the number of days from sowing to flowering and 15 is the number of days between the beginning of flowering and the start of pod expansion (Ntare et al. 2001).

Haulm weight and pod weight were converted in haulm yield (Hy) and pod yield (Py), expressed in g m^{-2}, and used to determine the total biomass (Bt = Hy + Py x 1.65) and the pod weight was multiplied with a correction factor of 1.65 (Duncan et al. 1978) to adjust for the differences in the energy requirement for producing pod dry matter compared with vegetative part. Harvest index (HI) was determined as a ratio of adjusted pod weight to total biomass (HI = 1.65*Py/Bt).

Statistical analysis

The results were performed with Gensat software, version 13. The data were subjected to analysis of variance (ANOVA) procedure for a linear mixed model. The Residual Maximum Likelihood (ReML) method of Genstat was used to obtain the unbiased estimate of the variance components and the best linear unbiased predictions (BLUPs) for the different parameters measured within each treatment, considering genotypes as random and replications as fixed effects. The significance of the genetic variability among accessions within treatment was assessed from the standard error of the estimate of genetic variance $\sigma^2_{g.}$ Two way ANOVA analyses were also performed to assess the effects of water treatment (Trt) and genotype-by-water treatment (GxTrt) interaction, year (Y) and genotype-by-year (GxY) interaction, and environment (E) and genotype-by-environment (GxE) interaction, for the different traits measured. In this case, variation components involving G were considered as random effects whereas Trt, Y, E and replication effects were considered as fixed. The significance of genetic variability across treatments or of the interaction effect was assessed in a manner similar to the above. The significance of the fixed effect was assessed using the Wald statistic that asymptotically follows a χ^2 distribution.

Results

Weather

The determined VPD during the high temperature season 2009 and 2010 (3.68 and 3.66 kPa respectively) were higher than the VPD during the moderate temperature season 2008 and 2009 (2.0 kPa and 1.8 kPa respectively) (Figure 1A). Higher maximum temperatures (41^0C in average) were observed during high temperature experiments (Figure 1B), than during the moderate temperature season experiments. In addition, Figure 1C shows that the averaged soil temperature at 5cm during high temperature reached 49^0C while it reached 42^0C during the moderate temperature season experiments. At 10cm, the soil temperature in the high temperature season was 40^0C compared to 35^0C in the moderate temperature season.

Genotype, water treatment, and genotype by water treatment interaction (GxTrt)

The combined analyses of variance for pod yield (Py), haulm yield (Hy) and harvest index (HI) of the 268 genotypes for the HT09 and HT10 experiments showed a strong water treatment effects in both years (Table 1). The genotype (G) and genotype-by-treatment (GxTrt) effects were also highly significant for the three traits in both years, and the magnitude of their effects was similar for each of the traits in both years.

Under fully irrigated conditions the trial mean for pod yield was similar in the high temperature and the moderate temperature seasons. By contrast the haulm weight was somewhat higher in the high temperature than in the moderate temperature seasons, especially in the HT09 trial (Table 2). As a consequence, the harvest index (HI) was slightly higher in the moderate temperature seasons (0.38 and 0.37) than in the high temperature season (0.25 and 0.34). The high temperature seasons were about 10 days longer than the moderate temperature seasons (130 vs 120 days).

Drought stress decreased the pod and haulm yield and HI in both moderate temperature and high temperature experiments (Table 2). However, the pod yield decrease due to drought stress was lower in the MT08 and MT09 (55 and 38% respectively) than in the HT09 and HT10 seasons (72 and 59% respectively). These results indicated that the intermittent drought stress had a more severe effect on pod yield during the high temperature than during the moderate temperature seasons, which likely relates to the higher temperatures of the high temperature seasons (Fig. 1). The HI decrease due to drought stress was also higher during the high temperature seasons (50 and 33% in HT09 and HT10, respectively) than in the moderate temperature seasons (25% for both MT08 and MT09. The contrary was observed for haulm yield, which decreased less in the high temperature seasons (34 and 11%) than in the moderate temperature seasons (42 and 31%).

Year effect and genotype by year interaction (GxY)

In the high temperature trials, a significant year (Y) effect was found for pod yield, haulm yield and harvest index (HI) for both well watered (WW) and water stress (WS) (Table 3). For each of the water treatments, the genotype (G) and genotype-by-year (GxY) effects were both significant for all three traits, and the magnitude of the GxY effect was similar or above the magnitude of the G effect for pod and haulm yield while it was less than the G effect for the harvest index. The high significance of GxY interaction under WW and WS conditions suggests a close interaction between the environmental conditions and the genotypic response to drought in combination to a high temperature stress effect, leading to GxY variation for pod and haulm.

Environment effect and genotype by environment interaction (GxE)

A combined analysis of variance (ANOVA), carried out within treatment, showed that genotype, environment, and genotype-by-environment (GxE) effects were all significant for pod yield, haulm yield and HI under both water treatments. The environment effect appeared to be particularly strong under WS for all three traits. For each water treatment, the magnitude of the GxE interaction effect was higher than the magnitude of the G effect for all three traits, in particular for pod yield (Table 4). The high significance of GxE under both water treatments compared to G effect indicates that while part of the variation was explained by genotypic effects, a larger part of the phenotypic variation was explained by GxE interaction effects across environment-treatments combination.

Genotype and Genotype by Environment (GGE) biplot analysis

One of the objectives was to test whether the selection of high yielding genotypes under WW and/or WS conditions in the moderate temperature season would be different from those selected during the high temperature season. The statistical analysis above indicate that large GxE and GxY interactions took place and, therefore, several GGE biplot analyses were performed to identify superior high yielding genotypes under WW and WS conditions within and across moderate and high temperature seasons.

A first effort consisted in identifying high yielding genotypes across years within temperature seasons for each of the water treatments (WW and WS) (Figure 2). For each of the combinations the GGE byplot organized the genotypes against two axes. Genotypes being the farthest on the left in the axis carrying the arrow were those with the highest yield across two years, within each temperature and water treatment combinations. For instance, under WW treatment and moderate temperature, the ten highest yielding lines under high temperature conditions were 133, 206, 131, 135, 254, 130, 132, 220, 139, 119, (Figure 3A), and are given with a genotype name in Table 6 as high yielding under WW treatment and high temperature (HY-HT). For moderate temperature seasons under WW treatment, genotypes 45, 245, 240, 253, 168, 51, 33, 267, 90, 221, were the highest yielding (Figure 3B; Table 6; Suppl. Table). A similar selection was done for the WS treatment in each of the high and moderate temperature environments (Table 6; Figure 3C & 3D). The fact that the four combination of water and temperature regime did not yield the same list of highest yielding genotypes also reflects the high GxY interactions that are reported in Table 3.

To identify genotypes with broad adaptation within water regime and across temperature conditions, a comparison biplot was developed (Figure 3), in which each genotype's position relative to the ideal genotype (center of the target) under WW (Figure 3A) and WS conditions (Figure 3B). Under WW conditions, genotypes 242, 240, 253, 168, 220, 140, 244, 245, 46 and 165 (Figure 3A, Table 6 and Supplementary Table) were the most adapted across both moderate and high temperature environments (Figure 3A). Under WS conditions, the most adapted genotypes across moderate and high temperature environments were 153, 21, 131, 116, 191, 111, 185, 102, 163 and 164 (Figure 3B, Table 6 and Supplementary Table). The poorest adapted genotypes under WW across both MT and HT environments were ICG 188, ICG 1534, ICG 4906, ICG 6402 and ICG 6667 while ICG 188, ICG 8083, ICG 9362, ICG 11862 and ICGV 99001 were the poorest adapted under WS conditions.Figure 3 also reflects the large GxE interaction reported in the Table 4.

Correlations between pod yield and possible traits

Correlation analysis between pod weight and traits recorded during the growing season and after harvest is shown in table 5. As observed previously (Hamidou et al. 2011), the pod weight was significantly related to the crop growth rate (CGR) and pod growth rate (PGR) under both WW and WS conditions in both moderate temperature seasons (Table 5). By contrast, no significant relationship was observed between pod weight and CGR or PGR in the high temperature trials, except a weak relationship of pod yield with PGR in the HT10 trial. The partition rate (P) was significantly correlated to the pod yield in MT08, HT09 and HT10 experiments under the two water treatments. Under WW and WS conditions during the four experiments, pod weight was not significantly correlated to the time to flowering (Flo) and neither to the Spad chlorophyll meter reading (SMCR).

Discussion

This study revealed a wide genotypic variation for pod yield, haulm yield and harvest index during high temperature in the two years. Drought stress decreased pod yield and the harvest index (HI) more during the high temperature season than during the moderate temperature season. A combined analysis across environments showed the predominance of GxE effects on the three traits under both WW and WS conditions, showing that genotype's performance in the moderate and high temperature seasons differed. Under both WW and WS treatments, GGE biplot allowed the identification of genotypes having specific adaptation to moderate and high temperature conditions, or both. The partition rate was significantly correlated to pod weight in the moderate temperature season but not in the high temperature season, whereas SPAD and time to flowering were not significantly related to pod weight in any of the seasons.

Drought stress decreased pod yield in both moderate temperature and high temperature seasons but the effect was higher during the high temperature (72%) than during the moderate temperature season (55%). Under drought conditions, the harvest index also decreased more during the high temperature season (50%) than during the moderate temperature season (25%). On the contrary, drought decreased haulm yield relatively more in the moderate temperature season (42%) than in the high temperature season (34%) and under WW conditions, haulm yield was somewhat increased in the high temperature season. In addition, the HI was relatively lower in the high temperature season (0.25 and 0.34) than in the moderate temperature season (0.37 and 0.38). The daily VPD (3.67 PKa), the maximum air temperature (41^{o}C) and the soil temperature (49 ^{o}C) at high temperature were higher than those under moderate temperature (1.9 PKa, 35 ^{o}C, 42 ^{o}C respectively). The decrease in HI under high temperature conditions under WW condition suggests an effect of the high temperature on the reproductive processes, but not on plant growth. The small differences in pod yield between moderate temperature and high temperature seasons are then explained by a higher growth in the high temperature, in part explained by the longer season duration, than in the moderate temperature season. Then under high temperature combined with drought stress, the effect of heat on the reproductive processes is reinforced. Thus, the greater depressive effect of drought on pod yield and harvest index in the high temperature season compare to the moderate temperature season can be explained by the additional effect of high temperature on the reproductive processes under drought. Previous works reported that reproductive processes in groundnut are sensitive to temperature. Increasing air and soil temperatures reduced fruit-set, pods number and yield in groundnut (Vara Prasad *et al.* 2000; Craufurd *et al.* 2000; Craufurd et al. 2003). In addition, Ntare et al. (2001) showed that pod yield of groundnut genotypes declined by more than 50% when flowering and pod formation occurred when maximum temperatures averaged 40 °C.

We observed that under WW conditions, the partition rate was 0.82 and 0.77 under moderate temperature 2008 and 2009 while it decreased to 0.59 and 0.60 under high temperature. Under WS conditions, the partition rate under moderate temperature 2008 and 2009 was 0.69 and 0.68 respectively whereas it was 0.28 and 0.26 at high temperature 2009 and 2010. These findings indicate a difference of partition rate between high temperature and moderate temperature season. The effect of high temperature stress on pod formation during high temperature can explain part of these differences. In addition, high temperature stress could decrease the partition rate. Songsri et al. (2008) reported that the ability to partition dry matter into harvestable yields under limited water supply is an important trait for drought tolerant genotypes.

Genetic variation is an essential prerequisite for any crop improvement program (Ober et al. 2002) and wide genotypic variation was shown for pod yield, haulm yield and harvest index under control (WW) and drought (WS) conditions across years, in agreement with previously reported results (Rebetzke et al. 2004; Singh et al. 2008). Genotypic and genotype by water treatment interaction (GxTrt) were both significant and had similar magnitude for both moderate temperature and high temperature seasons 2009 and 2010, indicating the need to select genotypes under each respective water treatment. In this study, significant year (Y) and genotype by year interaction (GxY) effects were also observed on pod and haulm yield in each of two water treatments. The high significance of GxY interaction under WW and WS conditions suggests a close interaction between the environmental conditions and the genotypic response to drought within moderate temperature and high temperature conditions.

The magnitude of GxE therefore suggests that the selection for best genotypes is specific to the screening environment, which was confirmed by GGE biplots, used to analyze GxE interactions. Therefore, in each water regimes the highest yielding genotype in the moderate temperature season differed from those in the high temperature season. Table 6 provides a list of genotypes that were high yielding across years within temperature seasons, for the WW and WS conditions respectively. For instance genotypes ICG 7181, ICG 8253, ICG 8285 are three of the ten highest yielding genotypes under WW conditions across moderate temperature reported in Table 6. Similarly, genotypes ICG 5891, ICG 6057, ICG 9777 are three of the ten highest yielding genotypes under WS conditions across moderate temperature season. This specific adaptation could be exploited in breeding program to develop cultivars targeted to environments with differing temperatures. Interestingly, the selection for highest yields under WW conditions in either moderate or high temperature seasons tended to select genotypes that would yield relatively poorly under WS conditions (third column). Reversely, the selection of the highest yielding genotypes under WS across moderate or high temperature seasons clearly selected genotypes with moderate yield under WW conditions (sixth column). This, in fact, was a clear reflection of the large GxY and GxE interactions reported earlier. Similar results were found by Ntare et al. (1998).

Since it is also reported that highest yielding genotypes are those with high yield in different environments and producing consistently from year to year (Reza et al. 2010; Finlay et al. 1963), other GGE byplots were developed to identify genotypes with consistently high yield across year and temperature seasons, for each of the WW and WS treatments. A number of genotypes having broad adaptation to moderate and high temperature conditions are also reported in Table 6. These could be considered as having the most “stable” yields across seasons, although they may not have the highest yield within specific temperature season This study suggests that, according to the target environment (moderate or high temperature), the water treatment (WW, WS) and, the yield and stability, different genotypes could be recommended.

Conclusions

High temperature had major effects on the reproductive processes, both under WW and WS conditions, whereas growth processes were not affected in the high temperature season. Large GxE interaction for pod yield in both water regimes indicated the need for selection of genotypes in each environment. Several broadly adapted genotypes were identified, with the capacity of securing reproduction at temperature above 40ºC.

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Table 1 ANOVA (F value) for pod (Py), haulm (Hy) and harvest index (HI) at Sadore during the high temperature 2009 (HT09) and 2010 (HT10), in which genotype (G), water treatment (Trt) and GxTrt interaction effects were tested (Df = degree of freedom). ANOVA for the moderate temperature trial is reported in Hamidou et al 2012, FCR, doi:10.1016/j.fcr.2011.10.009

		High Temperature 2009 (HT09)			High Temperature 2010 (HT10)		
	Df	Py	Hy	HI	Py	Hy	HI
G	267	3.67***	6.28***	8.18***	3.30***	2.58**	7***
Trt	1	3061***	1812***	1475***	1955***	86***	1386***
GxTrt		4.47***	7.34***	6.31***	3.48***	4.29***	3.79***

, and * superscript indicate significance at the 0.01 and 0.001 level.

Table 2 Trial means, range of expected means (Max and Min), variance component, standar error (SE), F-probability, standard error of differences (SED) within treatment of pod yield (Py), haulm yield (Hy) and harvest index (HI) during moderate temperature (MT) and high temperature (HT) under well-watered (WW) and water stress (WS) treatments.

	Moderate temperature 2008 (MT08)						Moderate temperature 2009 (MT09)					
	WW			WS			WW			WS		
	Py	Hy	HI	Py	Hy	HI	Py	Hy	HI	Py	Hy	HI
Mean	272.3	433.6	0.4	121.2	252.7	0.3	238.3	403.4	0.4	84.5	710.4	0.1
Max	360.1	615.4	0.5	149.4	404.7	0.5	310.9	571.2	0.5	216.2	1922	0.2
Min	194.6	277.3	0.2	86.0	130.2	0.2	192.8	201.9	0.2	59.5	493.8	0.1
Component	1727	4944	0.0027	302	2160	0.0040	1000	8014	0.0033	545	35820	0.0018
SE	275	679	0.0003	51	261	0.0005	215	955	0.0004	120	6289	0.00014
Prob	6.28***	7.28***	8.96***	5.92***	8.28***	8.25***	4.65***	8.39***	8.51***	4.54***	5.70***	8.45***
SED	39.2	59.81	0.035	16.96	34.68	0.047	34.83	70.59	0.044	25.43	188.4	0.025
	High temperature 2009 (HT09)						High temperature 2010 (HT10)					
Mean	311.5	1086.6	0.2	84.5	710.4	0.1	232.3	447.8	0.3	95.9	397.6	0.2
Max	458.1	3008.9	0.4	216.2	1922.2	0.2	276.5	612.8	0.5	139.7	509.6	0.3
Min	195.7	503.6	0.1	59.5	493.8	0.1	167.5	267.2	0.2	61.8	236.2	0.1
Component	2566	176452	0.00538	545	35820	0.00117	880	7461	0.00470	422	4008	0.00235
SE	385	18128	0.000523	120	6289	0.00014	152	860	0.00048	70	516	0.00029
Prob	6.66***	9.73***	10.30***	4.54***	5.69***	8.44***	5.78***	8.67***	9.79***	6.028***	7.76***	7.99***
SED	46.08	234.2	0.03412	25.43	188.4	0.02478	30.46	67.79	0.04581	20.71	54.6	0.04087

*** superscript indicate significance at the 0.001 level.

Table 3 Two-way ReML analysis for pod yield (Py), haulm yield (Hy) and harvest index (HI) under well-watered (WW) and water stress (WS) conditions at Sadore during the high temperature season 2009 and 2010, in which genotype (G), year (Yr) and genotype-by-year interaction (GxYr) effects were tested (df = degree of freedom).

		WW			WS		
	df	Py	Hy	HI	Py	Hy	HI
G	267	4.43***	1.21	9.13***	2.78**	3.54***	6.82***
Yr	1	297***	257***	141***	67***	482***	55***
GxYr	267	3.74***	8.5***	5.23***	3.59***	4.18***	4.57***

, and * superscript indicate significance at the 0.01 and 0.001 level

Table 4 Two-way ReML analysis for pod yield (Py), haulm yield (Hy) and harvest index (HI) under well-watered (WW) and water stress (WS) conditions at Sadore during the moderate temperature season of 2008 and 2009, and high temperature season 2009 and 2010, in which genotype (G), environment (E) and genotype-by-environment interaction (GxE) effects were tested (df = degree of freedom).

		WW			WS		
	df	Py	Hy	HI	Py	Hy	HI
G	267	2.55**	4.43***	8.77***	3.07**	6.68***	8.77***
E	3	102***	756***	204***	255***	353***	1191***
GxE		7.20***	11.33***	10.49***	7.75***	8.77***	8.98***

, and * superscript indicate significance at the 0.01 and 0.001 level

Table 5 Correlation analysis between the pod yield and crop growth rate (CGR), pod growth rate (PGR), partition (P), time to flowering (Flo) and Spad chlorophyll meter reading (SMCR) that were recorded in the field under well-watered (WW) and water stress (WS) conditions during the moderate temperature (MT08 and MT09) and high temperature (HT09 and HT10) seasons

		Pod yield			
	Trait	MT08	HT09	MT09	HT10
WW	CGR	0.69**	0.068	0.45**	0.0067
	PGR	0.76**	0.061	0.80**	0.12*
	P	0.17*	0.25*	0.18*	0.22*
	SCMR	-	-	0.063	0.009
	Flo	0.037	0.01	0.07	0.015
WS	CGR	0.38**	0.01	0.51**	0.00001
	PGR	0.85**	0.009	0.91**	0.07
	P	0.47**	0.19*	0.16*	0.21*
	SCMR	-	-	0.026	0.012
	Flo	0.13*	0.001	0.012	0.055

* significant at P<0.05; ** Significant at P<0.01

Table 6: Highest yielding (HY) and lowest yielding (LY) genotypes under either well-watered (WW, bold) or water stress (WS, bold) conditions during moderate (MT), high (HT), and or across (MTHT) temperature seasons. For either selection case (WW or WS) pod yield (Py, g m^{-2}) is also given for the other water treatment (WS or WW, normal font). For MT and HT, the means are those of two seasons within each temperature regime and water treatment, whereas for MTHT, the means are those of the four seasons within water treatment. Genotypes labeled with MTHT are those with broad adaptation to different temperature conditions.

	WW					**WS**	
Genotypes	**Py-WW**	Py-WS	Characteristics in WW conditions	Genotypes	Py-WW	**Py-WS**	Characteristics in WS conditions
ICG 7181	**406**	116	HY-MT	ICG 5891	244	**215**	HY-MT
ICG 8253	**384**	150	HY-MT	ICG 6057	245	**192**	HY-MT
ICG 8285	**434**	68	HY-MT	ICG 9777	244	**225**	HY-MT
ICG 8490	**404**	152	HY-MT	ICG 9809	208	**130**	HY-MT
ICG 8517	**477**	139	HY-MT	ICG 11109	269	**197**	HY-MT
ICG 8751	**433**	158	HY-MT	ICG 11542	354	**218**	HY-MT
ICG 9315	**412**	147	HY-MT	ICG 12625	244	**211**	HY-MT
ICG 13982	**442**	119	HY-MT	ICG 15386	368	**218**	HY-MT
ICG 14985	**417**	52	HY-MT	J 11	224	**203**	HY-MT
ICGV 02271	**409**	125	HY-MT	ICGV 97183	375	**227**	HY-MT
ICG 1668	**464**	98	HY-HT	ICG 862	245	**181**	HY-HT
ICGV-SM99507	**506**	103	HY-HT	ICG 8285	280	**181**	HY-HT
ICG 2925	**442**	105	HY-HT	ICG 1703	265	**108**	HY-HT
ICG 5236	**384**	120	HY-HT	ICG 4729	249	**144**	HY-HT
ICG 11219	**441**	109	HY-HT	ICGV-SM99504	279	**154**	HY-HT
ICG 15042	**430**	134	HY-HT	ICG 10053	243	**173**	HY-HT
ICG 15403	**559**	104	HY-HT	ICG 12991	316	**171**	HY-HT
ICGV 02266	**493**	85	HY-HT	ICG 12879	193	**181**	HY-HT
ICGV 98294	**398**	134	HY-HT	ICG-13943	247	**130**	HY-HT
ICG 1668	**464**	98	HY-HT	ICG 15042	286	**104**	HY-HT
ICG 2738	**295**	117	HY-MTHT	ICG 862	265	**140**	HY-MTHT
ICG 9362	**313**	90	HY-MTHT	ICG 6022	300	**108**	HY-MTHT
ICG 11088	**283**	153	HY-MTHT	ICG 6646	277	**142**	HY-MTHT
ICG 11219	**323**	176	HY-MTHT	ICG 6813	273	**157**	HY-MTHT
ICG 14985	**315**	109	HY-MTHT	ICG 8285	311	**124**	HY-MTHT
ICG 15403	**327**	120	HY-MTHT	ICG 10053	302	**167**	HY-MTHT
ICG 15415	**342**	115	HY-MTHT	55-437	313	**161**	HY-MTHT
J 11	**312**	150	HY-MTHT	ICG 10950	319	**149**	HY-MTHT
ICGV 01232	**329**	136	HY-MTHT	ICG 12509	274	**155**	HY-MTHT
ICGV 02266	**344**	112	HY-MTHT	ICG 12879	267	**168**	HY-MTHT
ICG 76	**138**	92	LY-MT	ICG 188	162	**54**	LY-MT
ICG 6667	**118**	83	LY-MT	ICG 2738	136	**66**	LY-MT
ICG 6766	**154**	88	LY-MT	ICG 4670	193	**76**	LY-MT
ICG 12921	**129**	106	LY-MT	ICG 8083	182	**64**	LY-MT
ICGV 02148	**124**	128	LY-MT	ICG15390	164	**83**	LY-MT
ICG 188	**181**	53	LY-HT	ICG 9905	134	**130**	LY-HT
ICG 1534	**185**	89	LY-HT	ICG 11862	178	**65**	LY-HT
ICG 4906	**116**	67	LY-HT	ICG 12189	152	**145**	LY-HT
ICG 6667	**104**	83	LY-HT	ICG 12682	187	**169**	LY-HT
ICG 7963	**184**	125	LY-HT	ICG 1823	147	**94**	LY-HT

Figure 1: Weather conditions during the experimental periods of the moderate temperature season 2008 and 2009 (MT08 and MT09) and the high temperature season 2009 and 2010 (HT09 and HT10) at Sadore. VPD = vapor pressure deficit (A), Max = maximum (B), Min = minimum (B), ST05 and ST10 = soil temperature at 5cm and 10cm (C)

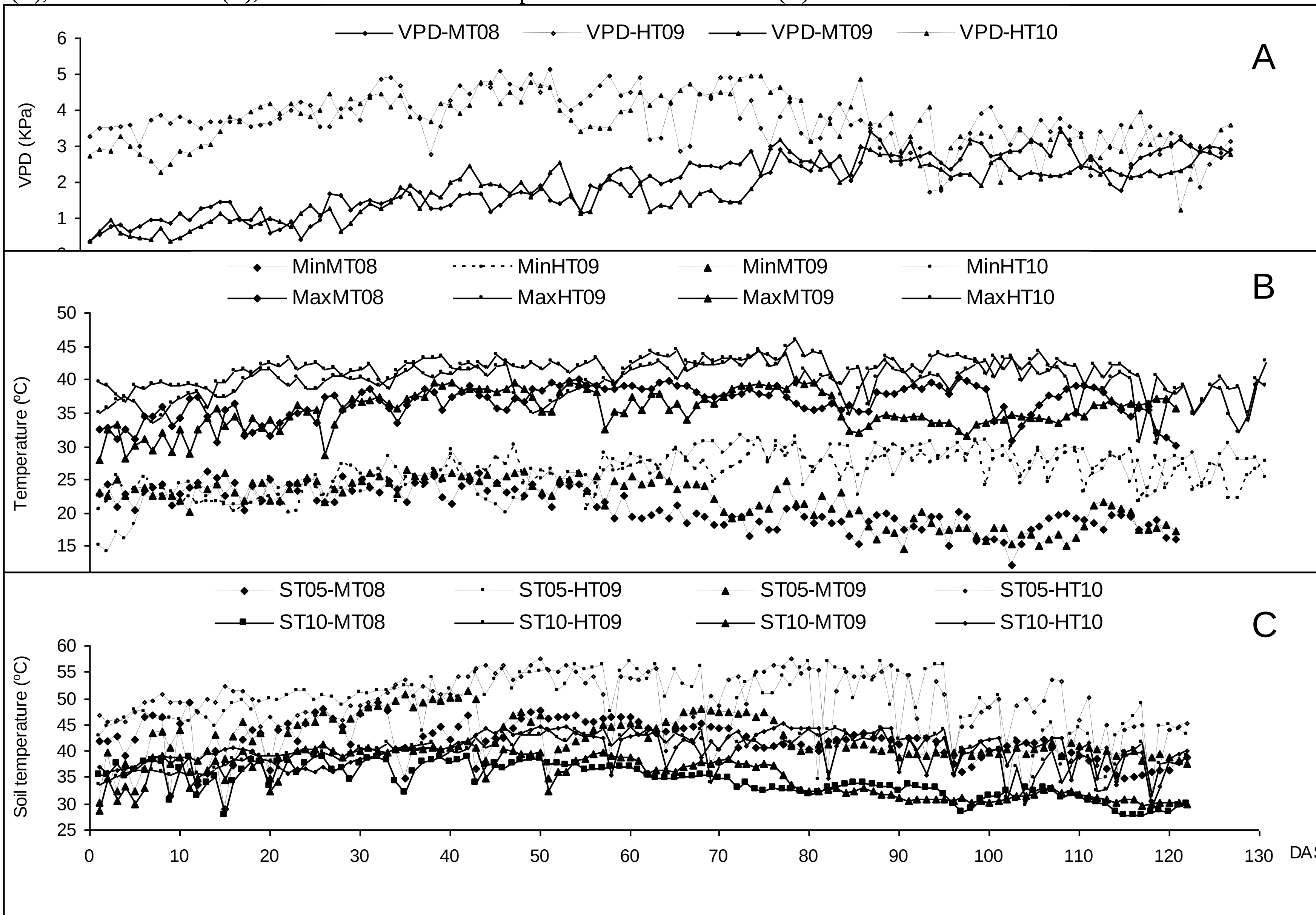


Figure 2: ranking genotypes based on yield performance in the moderate temperature (A and C) and high temperature season (B and D) under WW (A, B) and WS (C, D) conditions. For full name of genotypes, see table annex .

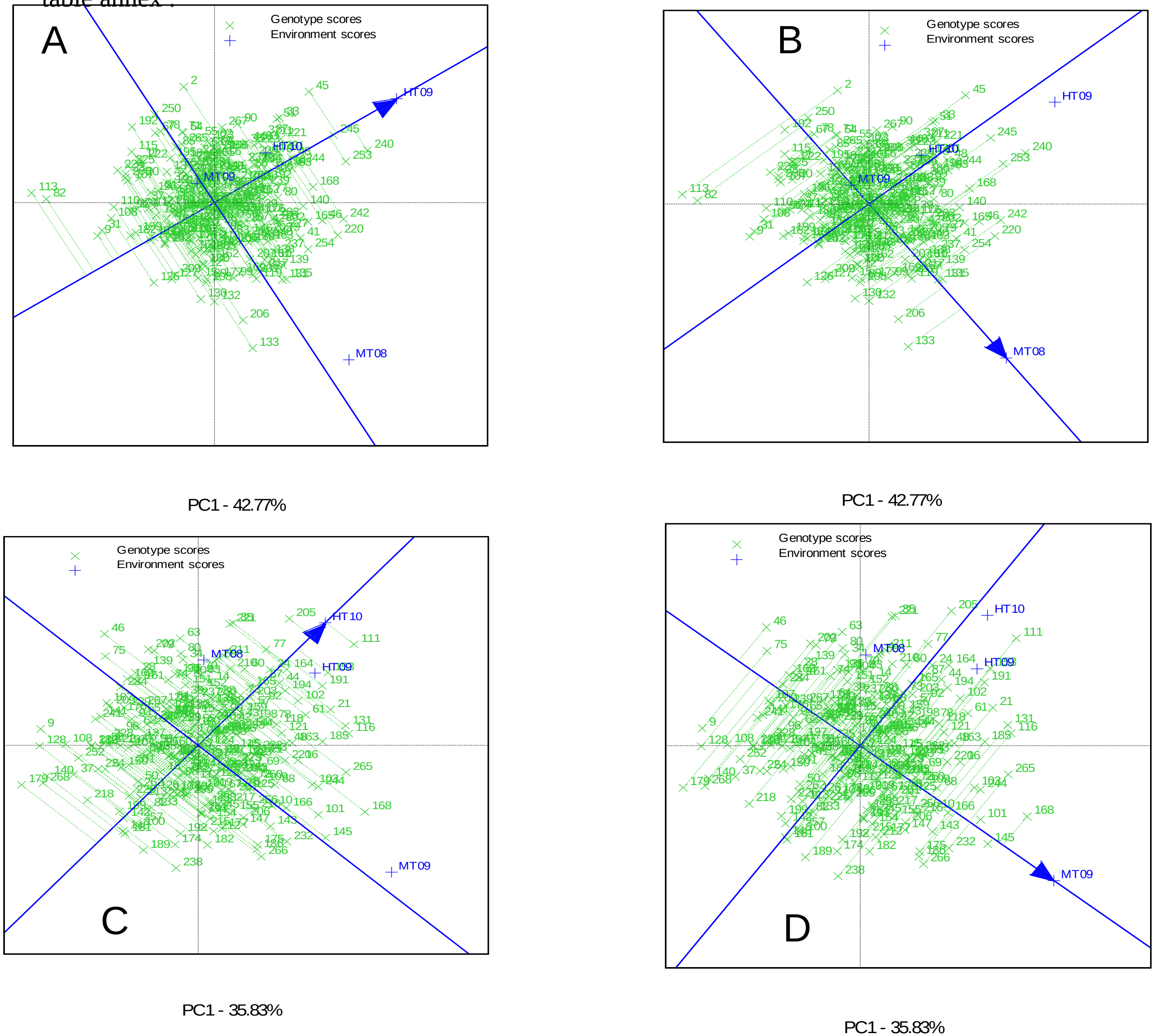
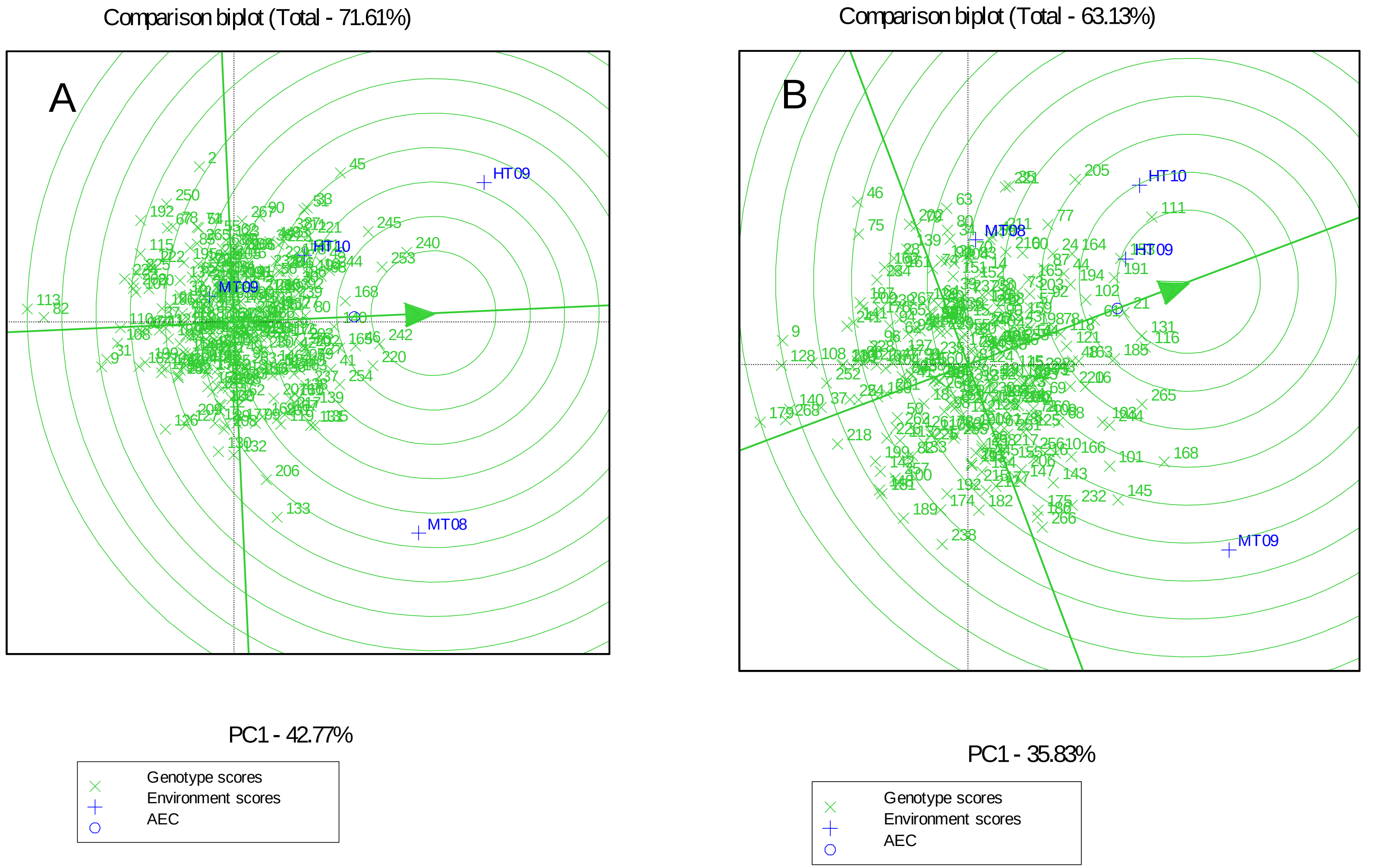


Figure 3: ranking for selecting genotypes with broad adaptation (all environments) under WW (A) and WS conditions (B). For full name of genotypes, see table 6.



Supplementary table 1: Pod weight (Pwt), Haulm weight (Hwt) and harvest index (HI) of 268 genotypes under Well water (WW and water stress (WW) conditions under moderate temperature 2008 (MT08) and 2009 (MT09), and at high temperature 2009 (HT09) and 2010 (HT10)

	WW												WS											
	MT08			HT09			MT09			HT10			MT08			HT09			MT09			HT10		
Genotype	Pwt	Hwt	HI	Pwt	Hwt	HI	Pwt	Hwt	HI	Pwt	Hwt	HI	Pwt	Hwt	HI	Pwt	Hwt	HI	Pwt	Hwt	HI	Pwt	Hwt	HI
ICG 36	250	443	0.36	314	894	0.37	204	380	0.40	171	486	0.26	121	210	0.37	30	516	0.09	161	273	0.36	85	356	0.15
ICG 76	138	198	0.35	385	1666	0.28	401	349	0.43	200	454	0.21	92	306	0.26	75	822	0.14	176	264	0.33	117	459	0.16
ICG 81	234	327	0.42	436	810	0.47	181	224	0.48	206	303	0.41	104	153	0.40	84	608	0.19	144	160	0.37	88	345	0.21
ICG 111	222	365	0.39	330	1346	0.28	190	402	0.34	247	369	0.26	101	384	0.23	83	872	0.14	112	271	0.33	165	489	0.14
ICG 115	234	426	0.36	290	925	0.33	145	427	0.28	245	600	0.26	92	289	0.25	61	567	0.17	107	218	0.26	61	429	0.10
ICG 118	237	408	0.36	354	1044	0.39	174	312	0.43	267	497	0.35	92	244	0.26	68	670	0.15	144	253	0.34	91	361	0.17
ICG-156	247	475	0.34	304	1346	0.26	244	309	0.49	203	428	0.33	104	237	0.29	55	779	0.11	123	247	0.37	145	537	0.15
ICG 163	238	421	0.35	312	1186	0.31	307	391	0.47	285	335	0.28	114	209	0.35	65	562	0.15	184	295	0.40	104	487	0.15
ICG 188	205	422	0.32	181	1075	0.22	162	575	0.28	93	293	0.30	53	277	0.15	35	732	0.07	54	287	0.15	91	500	0.13
ICG 297	404	438	0.43	343	845	0.49	294	431	0.41	202	505	0.28	78	196	0.28	100	471	0.26	190	259	0.36	94	347	0.22
ICG 311	233	465	0.31	233	866	0.30	233	358	0.39	200	674	0.20	84	245	0.25	55	727	0.12	168	324	0.35	86	425	0.12
ICG 332	354	588	0.37	246	757	0.34	267	493	0.35	204	621	0.25	135	302	0.31	54	551	0.14	126	298	0.33	111	458	0.10
ICG 334	212	449	0.30	265	918	0.32	247	372	0.40	267	533	0.21	110	274	0.28	76	810	0.13	142	319	0.40	129	412	0.11
ICG 397	254	315	0.40	238	711	0.37	165	290	0.41	224	413	0.29	107	197	0.33	83	488	0.23	120	211	0.41	142	328	0.20
ICG 405	347	528	0.40	240	692	0.36	167	496	0.30	180	425	0.31	117	257	0.29	80	896	0.13	130	324	0.30	113	436	0.10
ICG 434	311	485	0.40	405	748	0.47	271	450	0.41	311	517	0.35	99	245	0.29	98	662	0.20	189	239	0.37	128	396	0.20

ICG 442	170	397	0.32	253	753	0.34	236	548	0.33	232	598	0.24	90	272	0.25	49	609	0.12	113	244	0.32	104	439	0.09
ICG 513	206	440	0.31	291	1644	0.23	197	452	0.31	280	504	0.23	74	267	0.23	72	924	0.12	128	311	0.26	85	598	0.07
ICG 532	226	411	0.35	266	1797	0.20	235	429	0.39	237	489	0.24	64	251	0.21	87	875	0.14	143	332	0.31	118	432	0.17
ICG 721	192	457	0.30	226	1662	0.18	218	399	0.36	263	608	0.25	88	312	0.21	83	1098	0.12	153	388	0.32	93	464	0.10
ICG 862	225	337	0.39	353	1206	0.37	236	349	0.55	245	432	0.26	98	209	0.33	105	563	0.23	181	371	0.37	170	478	0.23
ICG 875	215	495	0.30	319	1964	0.21	241	344	0.44	257	431	0.27	104	286	0.27	71	736	0.14	169	286	0.37	123	427	0.11
ICG 928	173	357	0.30	206	1127	0.23	182	389	0.39	281	315	0.27	81	225	0.28	66	707	0.12	117	270	0.31	93	405	0.12
ICG 1137	301	321	0.47	336	642	0.46	261	397	0.43	175	298	0.34	128	212	0.39	73	551	0.20	149	201	0.37	177	422	0.24
ICG 1142	228	371	0.37	307	666	0.44	253	480	0.39	282	469	0.30	125	268	0.26	76	630	0.17	129	294	0.37	74	435	0.11
ICG 1274	289	538	0.34	240	712	0.36	292	462	0.34	171	533	0.10	125	326	0.22	82	693	0.16	174	317	0.28	60	388	0.07
ICG 1399	303	529	0.35	309	725	0.41	261	498	0.38	230	451	0.34	105	277	0.27	59	539	0.15	120	248	0.37	123	441	0.15
ICG 1415	275	471	0.36	359	694	0.46	200	336	0.41	327	574	0.39	136	273	0.31	79	528	0.20	90	148	0.36	103	411	0.18
ICG 1487	303	422	0.40	303	706	0.42	235	337	0.44	252	424	0.32	140	297	0.32	114	577	0.23	142	192	0.39	67	306	0.17
ICG 1519	298	321	0.47	386	516	0.55	231	259	0.48	271	294	0.49	132	177	0.44	103	469	0.26	151	225	0.43	95	314	0.25
ICG 1534	215	409	0.33	185	650	0.32	250	541	0.29	113	316	0.24	89	206	0.24	94	727	0.15	115	370	0.28	76	350	0.18
ICG 1569	226	521	0.29	253	983	0.30	253	531	0.30	273	463	0.34	122	323	0.27	78	855	0.13	124	230	0.29	98	441	0.14
ICG 1668	233	457	0.33	464	2004	0.33	205	257	0.37	240	365	0.40	98	328	0.22	139	960	0.19	114	334	0.20	67	343	0.13
ICG 1699	235	437	0.34	333	748	0.44	193	310	0.42	242	524	0.35	125	267	0.31	64	590	0.17	105	142	0.37	150	376	0.20
ICG 1703	215	458	0.28	347	1457	0.33	178	283	0.43	265	366	0.41	143	347	0.27	139	889	0.20	108	169	0.40	134	333	0.30
ICG 1711	236	299	0.44	383	594	0.52	253	425	0.45	275	480	0.38	102	199	0.34	72	586	0.17	154	216	0.40	132	345	0.27
ICG 1823	211	467	0.30	252	852	0.33	186	520	0.27	147	525	0.19	78	284	0.21	43	607	0.10	94	287	0.25	61	333	0.16

ICG 1834	241	349	0.41	244	664	0.37	179	341	0.39	277	566	0.33	99	180	0.36	83	496	0.21	126	171	0.33	140	454	0.22
ICG 1973	328	578	0.37	345	867	0.39	203	288	0.45	267	563	0.35	120	201	0.40	79	512	0.21	118	187	0.44	118	487	0.19
ICG 2019	366	470	0.43	338	648	0.46	142	206	0.44	270	316	0.37	126	246	0.34	103	370	0.31	115	105	0.35	88	341	0.24
ICG 2031	389	436	0.44	371	734	0.45	139	291	0.41	274	448	0.35	147	235	0.39	54	517	0.15	136	178	0.37	69	488	0.15
ICG 2106	360	419	0.45	326	560	0.48	244	439	0.42	312	558	0.38	131	199	0.40	64	443	0.19	155	221	0.42	130	346	0.27
ICG 2286	278	459	0.37	299	946	0.34	225	342	0.42	124	400	0.25	127	227	0.36	83	582	0.20	153	223	0.37	124	375	0.24
ICGV-SM99504	246	283	0.46	386	717	0.47	266	390	0.46	279	397	0.36	120	138	0.44	91	506	0.22	154	195	0.38	163	442	0.22
ICGV-SM99507	232	362	0.39	506	1516	0.42	214	411	0.39	289	594	0.29	103	156	0.34	129	757	0.22	155	227	0.39	83	304	0.21
ICG 2738	382	525	0.40	428	710	0.49	136	359	0.33	235	326	0.31	168	244	0.41	96	567	0.21	66	136	0.30	87	399	0.16
ICG 2772	231	458	0.33	266	1460	0.23	196	356	0.41	210	405	0.21	105	239	0.31	79	940	0.11	111	245	0.35	71	356	0.14
ICG 2773	301	470	0.38	432	1928	0.27	267	438	0.44	271	478	0.23	100	270	0.27	126	861	0.20	173	237	0.33	112	497	0.11
ICG 2777	319	480	0.38	309	1706	0.23	301	362	0.43	184	540	0.19	130	316	0.28	89	719	0.15	149	385	0.30	100	408	0.11
ICG 2857	288	554	0.31	245	1671	0.19	283	428	0.42	139	497	0.14	74	264	0.22	91	1092	0.11	119	318	0.37	54	326	0.10
ICG 2925	242	360	0.39	442	1441	0.35	243	249	0.49	290	581	0.29	105	216	0.34	86	662	0.18	156	212	0.41	131	322	0.15
ICG 3027	283	514	0.34	299	1165	0.30	278	518	0.37	220	457	0.19	104	363	0.23	92	766	0.16	153	331	0.29	93	459	0.12
ICG 3053	253	465	0.35	275	1289	0.27	197	490	0.30	173	405	0.22	115	253	0.32	83	781	0.16	117	371	0.29	98	456	0.16
ICG 3102	181	293	0.36	317	898	0.35	258	430	0.35	277	501	0.23	104	241	0.29	73	743	0.14	140	217	0.33	87	402	0.14
ICG 3140	196	417	0.29	334	931	0.37	242	381	0.43	267	534	0.26	152	263	0.38	63	627	0.14	145	197	0.39	103	367	0.14
ICG 3240	276	452	0.38	389	852	0.43	278	414	0.43	210	389	0.35	135	296	0.30	86	693	0.18	157	266	0.42	101	433	0.15
ICG 3312	359	436	0.46	352	594	0.49	220	268	0.48	279	457	0.41	155	243	0.38	98	474	0.26	159	173	0.41	115	395	0.24
ICG 3343	295	433	0.41	275	700	0.36	221	403	0.39	261	586	0.31	126	303	0.28	97	768	0.18	140	238	0.35	115	347	0.16

ICG 3421	293	330	0.42	351	577	0.50	184	223	0.47	307	489	0.41	171	249	0.40	104	475	0.26	128	121	0.39	117	310	0.28
ICG 3584	305	366	0.45	318	527	0.49	244	251	0.45	297	529	0.39	169	221	0.44	99	459	0.27	144	176	0.41	128	400	0.24
ICG 3673	300	385	0.47	321	1258	0.31	244	556	0.34	221	680	0.23	143	279	0.32	194	1803	0.17	172	273	0.32	71	454	0.13
ICG 3681	209	308	0.40	344	800	0.41	210	489	0.30	285	579	0.31	134	193	0.40	68	574	0.18	114	234	0.30	80	467	0.11
ICG 3746	300	548	0.34	446	907	0.45	197	269	0.44	205	443	0.31	170	281	0.35	108	564	0.24	101	130	0.40	110	330	0.24
ICG 3775	276	405	0.39	389	730	0.47	195	467	0.33	271	454	0.38	125	227	0.35	81	498	0.22	114	295	0.34	105	465	0.17
ICG 3992	221	445	0.33	295	1917	0.22	302	404	0.34	225	533	0.17	112	349	0.29	39	1028	0.06	109	398	0.25	119	494	0.06
ICG 4111	247	493	0.33	274	780	0.36	180	345	0.37	154	542	0.22	111	272	0.31	43	565	0.12	140	288	0.38	105	370	0.15
ICG 4156	165	400	0.30	285	1344	0.26	322	472	0.41	266	326	0.26	94	319	0.23	59	891	0.10	170	379	0.34	103	375	0.14
ICG 4343	213	422	0.33	340	1418	0.28	255	380	0.45	246	578	0.24	106	244	0.31	103	801	0.19	189	338	0.37	95	429	0.13
ICG 4389	217	457	0.30	344	1652	0.31	208	337	0.41	269	498	0.21	101	281	0.27	80	867	0.13	177	308	0.37	117	447	0.13
ICG 4412	212	359	0.39	313	1755	0.22	206	444	0.34	238	401	0.21	82	263	0.24	78	1090	0.11	104	348	0.27	158	350	0.10
ICG 4527	174	301	0.36	332	1666	0.25	255	337	0.43	229	416	0.22	91	262	0.26	171	676	0.23	159	338	0.33	65	355	0.08
ICG 4538	212	477	0.31	296	1466	0.24	177	286	0.46	280	450	0.23	92	340	0.21	78	1220	0.10	176	201	0.42	111	489	0.12
ICG 4543	248	445	0.35	282	615	0.43	244	426	0.44	223	354	0.38	128	197	0.40	83	599	0.19	145	248	0.45	140	335	0.30
ICG 4598	234	388	0.38	216	1086	0.25	309	491	0.39	207	450	0.16	103	287	0.28	56	818	0.10	102	327	0.30	145	526	0.09
ICG 4670	309	444	0.40	328	644	0.48	193	276	0.45	212	414	0.37	155	259	0.38	66	554	0.22	76	153	0.40	101	407	0.17
ICG 4684	352	416	0.46	372	716	0.46	181	298	0.50	234	391	0.37	121	278	0.31	77	661	0.16	141	172	0.38	119	422	0.16
ICG 4729	321	497	0.41	378	738	0.46	241	312	0.48	249	563	0.28	164	168	0.45	107	587	0.24	144	161	0.41	147	401	0.27
ICG 4746	154	322	0.36	305	2183	0.24							101	156	0.29	142	1047	0.14						
ICG 4750	375	552	0.41	346	649	0.46	194	315	0.42	289	413	0.40	164	260	0.39	79	426	0.28	97	155	0.40	114	398	0.19

ICG 4764	327	454	0.41	391	665	0.49	200	310	0.43	239	515	0.34	165	332	0.31	91	529	0.23	109	154	0.43	116	529	0.14
ICG 4798	279	466	0.38	320	631	0.45	186	366	0.38	149	316	0.34	121	225	0.37	84	739	0.21	145	313	0.33	91	473	0.11
ICG 4906	137	223	0.38	116	794	0.22							67	184	0.27	38	471	0.12						
ICG 4911	311	533	0.37	312	984	0.35	216	394	0.40	246	605	0.26	166	216	0.46	81	544	0.20	128	176	0.38	119	382	0.21
ICG 4955	285	507	0.36	293	952	0.37	231	424	0.40	253	364	0.41	148	246	0.38	83	657	0.17	125	289	0.36	83	439	0.10
ICG 4998	190	392	0.33	303	1733	0.22	257	357	0.24	252	504	0.23	79	268	0.22	78	703	0.15	139	349	0.30	132	422	0.11
ICG 5016	275	479	0.37	311	1496	0.25	324	473	0.42	289	460	0.23	94	285	0.23	91	701	0.18	142	380	0.28	91	449	0.11
1190-13	250	339	0.44	434	1333	0.35	245	348	0.40	240	525	0.24	84	216	0.29	66	810	0.12	139	248	0.33	191	453	0.20
ICG 5195	260	475	0.35	268	584	0.41	183	362	0.34	267	481	0.39	127	251	0.34	66	555	0.16	104	221	0.33	58	334	0.23
ICG 5221	356	535	0.40	237	829	0.35	139	475	0.24	217	506	0.26	98	300	0.24	82	683	0.15	117	305	0.34	70	489	0.07
ICG 5236	223	277	0.44	384	647	0.49	301	372	0.49	300	462	0.42	120	197	0.36	69	605	0.23	144	166	0.37	133	431	0.26
ICG 5286	224	460	0.32	204	1797	0.19	262	384	0.39	209	309	0.25	99	291	0.28	65	1085	0.09	97	178	0.39	66	400	0.13
ICG 5327	303	303	0.50	415	1422	0.33	244	477	0.42	193	461	0.26	127	264	0.33	123	1365	0.14	152	213	0.32	117	437	0.16
ICG 5475	239	448	0.35	415	1197	0.38	155	400	0.33	241	602	0.27	103	252	0.29	131	685	0.22	96	205	0.36	99	421	0.15
ICG 5494	260	468	0.36	264	714	0.38	203	434	0.37	218	471	0.24	94	242	0.27	92	581	0.19	95	210	0.37	82	422	0.13
ICG 5609	321	587	0.35	290	858	0.38	191	487	0.31	244	468	0.28	96	258	0.26	68	521	0.21	108	305	0.32	101	380	0.11
ICG 5662	305	504	0.38	355	1344	0.30	228	509	0.23	242	640	0.24	109	283	0.26	71	781	0.13	101	264	0.28	76	450	0.08
ICG 5663	293	413	0.40	265	1534	0.23	244	489	0.36	228	619	0.24	103	337	0.23	114	831	0.20	81	219	0.26	88	466	0.10
ICG 5745	331	485	0.40	337	2134	0.26	307	385	0.48	231	441	0.32	110	228	0.32	91	1017	0.13	145	229	0.33	60	466	0.08
ICG 5779	396	458	0.47	255	578	0.42	260	339	0.47	266	353	0.43	139	221	0.38	87	441	0.25	127	166	0.43	59	255	0.20
ICG 5827	352	615	0.35	254	1664	0.20	289	576	0.38	197	443	0.22	73	393	0.14	46	1150	0.06	144	398	0.27	59	519	0.07

ICG 5891	264	450	0.36	303	1477	0.23	244	380	0.39	168	481	0.25	80	299	0.22	105	1130	0.14	215	251	0.29	106	499	0.11
ICG 6022	293	611	0.34	307	1977	0.22							108	302	0.26	164	901	0.23						
ICG 6057	288	530	0.36	357	1336	0.31	245	466	0.34	208	507	0.29	61	310	0.17	124	759	0.30	192	31	0.22	116	473	0.12
ICG 6201	310	434	0.41	280	600	0.44	192	393	0.35	168	384	0.31	111	240	0.30	77	489	0.21	112	233	0.35	65	383	0.15
ICG 6263	232	406	0.37	323	958	0.35	245	390	0.40	286	484	0.25	110	251	0.31	79	749	0.14	147	248	0.40	118	404	0.12
ICG 6375	246	374	0.39	277	979	0.37	253	356	0.41	279	402	0.30	89	182	0.33	76	683	0.12	152	270	0.42	75	399	0.16
ICG 6394	175	323	0.35	264	1356	0.24	244	326	0.40	105	328	0.24	80	200	0.31	80	701	0.15	99	232	0.36	75	419	0.16
ICG 6402	202	339	0.37	208	1482	0.20	202	504	0.28	112	377	0.22	94	230	0.34	46	758	0.13	81	337	0.22	68	550	0.06
ICG 6407	276	522	0.34	265	978	0.30	244	606	0.34	123	299	0.28	128	295	0.30	70	438	0.13	192	417	0.34	104	448	0.14
ICG 6643	204	397	0.35	189	2635	0.11							74	297	0.19	55	934	0.09						
ICG 6646	240	356	0.37	315	1919	0.32							142	278	0.33	212	1456	0.24						
ICG 6654	334	332	0.47	342	767	0.43	216	340	0.42	263	443	0.37	134	203	0.40	87	709	0.17	159	269	0.42	58	385	0.13
ICG 6667	118	290	0.28	104	919	0.16							83	252	0.25	34	489	0.07						
ICG 6703	323	505	0.41	326	735	0.41	270	400	0.45	243	385	0.39	163	309	0.34	75	473	0.17	162	273	0.42	60	352	0.15
ICG 6766	154	470	0.27	255	2866	0.13							88	413	0.15	110	2450	0.07						
ICG 6813	244	486	0.34	322	1132	0.34	285	373	0.47	240	458	0.35	112	302	0.30	108	880	0.17	203	241	0.37	155	481	0.15
ICG 6888	356	476	0.42	337	632	0.47	250	482	0.38	198	352	0.38	146	312	0.32	67	365	0.24	125	242	0.38	87	365	0.19
ICG 7153	251	435	0.35	248	1413	0.22	283	494	0.43	243	499	0.25	94	264	0.27	89	914	0.14	164	260	0.35	148	386	0.15
ICG 7181	406	606	0.39	293	797	0.38	203	623	0.24	237	584	0.26	116	288	0.27	52	493	0.16	99	286	0.23	65	454	0.08
ICG 7190	304	542	0.35	266	801	0.36	309	596	0.33	214	547	0.26	100	219	0.32	105	904	0.16	149	364	0.31	86	401	0.11
ICG 7243	242	523	0.32	245	1460	0.22	291	472	0.45	190	466	0.29	83	320	0.21	129	3033	0.10	162	254	0.35	122	479	0.10

ICG 7867	329	382	0.46	268	1189	0.27	154	508	0.30	150	567	0.18	119	195	0.39	96	996	0.16	101	253	0.23	41	552	0.04
ICG 7883	215	314	0.40	349	8185	0.25	299	493	0.39	250	703	0.25	73	245	0.24	139	1209	0.14	145	412	0.34	57	461	0.07
ICG 7897	269	487	0.36	209	2226	0.17							105	342	0.24	90	990	0.13						
ICG 7906	322	466	0.44	262	684	0.37	301	471	0.40	227	511	0.25	123	316	0.28	83	726	0.16	186	271	0.41	85	395	0.14
ICG 7963	328	367	0.42	184	939	0.25	268	606	0.31	171	451	0.19	125	253	0.33	95	874	0.15	142	363	0.28	31	432	0.04
ICG 7969	346	526	0.41	195	813	0.31	297	566	0.29	213	469	0.27	145	264	0.34	77	698	0.15	121	242	0.31	61	468	0.08
ICG 8083	293	296	0.51	282	418	0.51	182	370	0.37	239	307	0.49	67	105	0.40	42	222	0.25	64	191	0.31	69	271	0.20
ICG 8106	273	500	0.36	267	683	0.40	174	479	0.31	254	522	0.32	112	248	0.31	112	413	0.31	104	305	0.31	83	421	0.18
ICG 8253	384	573	0.41	218	718	0.33	227	340	0.43	200	443	0.32	150	257	0.37	67	607	0.17	132	175	0.38	105	393	0.19
ICG 8285	434	765	0.37	310	1324	0.27	218	474	0.34	280	669	0.26	68	367	0.15	157	898	0.23	181	371	0.33	142	497	0.10
ICG 8490	404	531	0.41	226	1323	0.24	263	373	0.46	221	440	0.16	152	340	0.32	85	590	0.21	130	364	0.38	89	436	0.11
ICG 8517	477	666	0.41	252	929	0.32	185	461	0.31	167	541	0.24	139	268	0.33	42	636	0.17	159	353	0.29	51	417	0.10
ICG 8567	358	528	0.36	329	772	0.42	210	386	0.38	226	478	0.34	109	231	0.32	85	614	0.19	169	255	0.40	96	391	0.20
ICG 8751	433	676	0.39	344	1597	0.27	244	559	0.38	200	396	0.26	158	327	0.33	117	1039	0.18	137	368	0.31	81	427	0.17
ICG 8760	356	778	0.31	319	2166	0.20	207	523	0.36	228	534	0.19	99	385	0.20	66	1014	0.10	101	347	0.28	147	478	0.14
ICG 9037	281	471	0.31	305	1516	0.26	288	423	0.43	211	569	0.18	87	271	0.25	84	829	0.13	144	217	0.31	99	468	0.08
ICG 9249	391	645	0.38	342	911	0.37	256	489	0.33	200	379	0.25	108	221	0.34	87	626	0.18	132	314	0.34	75	448	0.07
ICG 9315	412	487	0.45	338	673	0.45	201	323	0.43	238	466	0.35	147	215	0.40	90	635	0.19	94	151	0.42	100	338	0.20
ICG 9362	362	420	0.46	409	880	0.46	223	336	0.46	258	329	0.37	93	187	0.33	35	658	0.14	87	135	0.42	47	287	0.13
ICG 9418	291	358	0.46	293	844	0.38	261	544	0.31	119	379	0.27	113	200	0.38	67	593	0.19	88	196	0.35	78	326	0.18
ICG 9449	284	489	0.38	247	852	0.34	248	337	0.35	128	414	0.24	103	183	0.37	48	620	0.12	141	316	0.33	43	199	0.11

ICG 9507	339	484	0.41	272	832	0.34	244	448	0.41	227	470	0.28	107	227	0.32	58	558	0.15	210	453	0.35	99	392	0.13
ICG 9666	251	440	0.36	259	1116	0.28	179	283	0.41	214	297	0.28	68	272	0.21	75	744	0.15	147	182	0.37	153	471	0.20
ICG 9777	258	504	0.33	342	2319	0.21	244	615	0.27	233	553	0.18	80	357	0.19	123	950	0.17	225	446	0.29	82	460	0.08
ICG 9809	339	505	0.40	345	628	0.47	208	357	0.39	163	379	0.28	115	265	0.34	98	487	0.25	130	163	0.33	114	355	0.22
ICG 9842	289	574	0.31	291	1612	0.23	295	373	0.41	256	389	0.24	82	336	0.20	65	876	0.11	190	409	0.35	92	390	0.11
ICG 9905	262	540	0.33	274	2207	0.20	161	473	0.45	134	517	0.12	52	325	0.14	65	956	0.10	130	431	0.35	45	444	0.07
ICG 9961	285	469	0.42	305	1185	0.29	300	395	0.47	149	323	0.33	88	269	0.25	73	668	0.15	138	269	0.38	122	350	0.12
ICG 9987	274	658	0.29	204	1346	0.20	225	604	0.25	231	632	0.23	90	406	0.18	54	926	0.08	114	497	0.16	75	509	0.09
ICG 10010	317	632	0.32	262	1298	0.25	244	427	0.41	162	491	0.18	136	279	0.32	84	735	0.15	118	414	0.25	115	349	0.16
ICG 10036	298	445	0.40	373	1663	0.28	177	437	0.39	207	585	0.26	122	311	0.27	117	593	0.24	118	238	0.33	102	366	0.22
ICG 10053	297	444	0.39	372	1136	0.36	294	461	0.42	243	591	0.27	161	295	0.35	168	671	0.28	173	329	0.34	119	376	0.13
ICG 10092	310	489	0.36	256	841	0.34	272	586	0.33	202	424	0.31	112	315	0.25	54	585	0.13	182	366	0.27	75	433	0.15
ICG 10185	271	655	0.27	342	1370	0.29	262	531	0.29	191	553	0.25	84	297	0.22	86	773	0.14	178	439	0.34	80	484	0.16
ICG 10384	296	486	0.35	247	736	0.35	227	444	0.35	231	494	0.26	145	203	0.41	100	631	0.20	119	306	0.34	76	404	0.08
ICG 10474	333	526	0.37	337	738	0.43	262	355	0.37	204	435	0.31	128	290	0.29	64	539	0.16	169	271	0.32	92	532	0.09
ICG 10479	276	435	0.38	221	1408	0.20	230	721	0.28	268	374	0.39	88	324	0.21	43	1032	0.08	122	302	0.20	107	401	0.15
FLEUR11	227	297	0.41	321	671	0.44	272	472	0.41	210	477	0.38	135	181	0.43	81	538	0.18	154	204	0.35	127	423	0.18
ICG 10566	332	563	0.39	240	801	0.33	194	588	0.44	269	616	0.27	126	240	0.34	63	560	0.16	134	502	0.23	87	484	0.08
ICG 10701	387	425	0.48	317	602	0.46	173	235	0.44	246	448	0.39	132	197	0.40	93	540	0.23	92	340	0.26	91	399	0.14
ICG 10890	350	463	0.46	243	617	0.39	200	286	0.44	271	281	0.49	154	176	0.46	69	574	0.15	95	199	0.37	95	257	0.19
55-437	382	485	0.44	338	620	0.48	288	384	0.47	245	321	0.39	135	199	0.41	98	524	0.23	188	227	0.37	120	353	0.24

ICG 10950	304	523	0.35	333	1362	0.29							149	325	0.31	157	794	0.22						
ICG 11088	370	486	0.42	439	1198	0.37	175	322	0.42	149	241	0.24	160	276	0.37	142	668	0.21	146	229	0.40	92	390	0.13
ICG 11109	353	693	0.36	288	1685	0.22	269	405	0.46	252	580	0.21	70	285	0.20	89	796	0.15	197	348	0.37	111	435	0.14
ICG 11144	407	625	0.40	299	847	0.37	250	522	0.31	252	536	0.30	126	249	0.34	68	712	0.15	144	487	0.26	91	418	0.13
ICG 11219	350	500	0.42	441	1545	0.33	251	321	0.47	250	649	0.26	109	381	0.22	102	882	0.12	242	313	0.37	119	412	0.11
ICG 11249	384	666	0.36	277	659	0.41	193	409	0.37	238	486	0.35	128	262	0.33	89	555	0.20	169	357	0.33	97	356	0.14
ICG 11322	273	323	0.44	428	854	0.46				226	439	0.25	109	210	0.34	42	749	0.09				130	375	0.15
ICG 11386	308	590	0.35	342	986	0.37	244	371	0.31	272	530	0.32	80	268	0.22	98	948	0.15	160	373	0.31	63		0.02
ICG 11426	240	461	0.33	296	2347	0.17							73	286	0.21	61	1317	0.09						
ICG 11457	272	462	0.34	197	1820	0.16	208	441	0.37	227	618	0.17	103	318	0.24	58	1290	0.08	168	332	0.36	123	473	0.10
ICG 11515	216	603	0.25	224	956	0.27	214	392	0.33	165	437	0.31	58	298	0.17	65	702	0.13	161	385	0.31	57	353	0.14
ICG 11542	322	605	0.35	258	848	0.34	354	603	0.37	200	463	0.27	128	298	0.31	59	603	0.14	218	515	0.31	71	404	0.07
ICG 11651	320	303	0.54	371	511	0.54	144	143	0.52	185	554	0.26	120	141	0.46	97	295	0.34	93	96	0.46	65	391	0.08
ICG 11687	384	505	0.44	266	585	0.43	336	259	0.51	178	357	0.25	109	187	0.38	58	499	0.16	190	284	0.42	73	414	0.10
ICG 11855	276	413	0.39	398	1383	0.33	242	347	0.43	290	505	0.37	103	225	0.31	99	736	0.19	170	197	0.38	74	489	0.13
ICG 11862	267	515	0.34	339	1724	0.24	244	356	0.50	178	563	0.23	42	271	0.12	42	624	0.09	65	169	0.26	47	447	0.07
ICG 12000	258	460	0.34	282	1710	0.22	289	412	0.38	253	402	0.24	110	263	0.28	76	1032	0.21	133	354	0.31	110	289	0.09
ICG 12189	318	458	0.41	268	797	0.36	193	464	0.36	152	435	0.26	90	217	0.27	42	474	0.12	145	279	0.33	44	440	0.07
ICG 12235	252	582	0.31	185	2436	0.11	244	476	0.43	203	470	0.19	47	210	0.17	53	853	0.09	175	400	0.24			
ICG 12276	307	457	0.38	330	1759	0.23	244	502	0.45	199	610	0.21	106	352	0.23	85	1007	0.13	172	313	0.35			
ICG 12370	283	534	0.35	358	1811	0.24	235	549	0.35	235	512	0.22	92	280	0.25	103	923	0.15	156	300	0.34	85	480	0.13

ICG 12509	302	468	0.39	352	921	0.39	244	370	0.55	200	442	0.31	111	281	0.29	75	683	0.16	198	265	0.35	162	544	0.14
ICG 12625	288	531	0.35	420	1777	0.28	244	450	0.44	182	418	0.29	116	300	0.29	96	890	0.14	211	302	0.41	46	265	0.09
ICG 12665	269	495	0.35	281	1334	0.25	288	376	0.42	185	358	0.17	134	334	0.27	62	585	0.15	91	331	0.20	84	475	0.08
ICG 12672	213	374	0.34	385	1783	0.27	174	167	0.42	164	444	0.15	99	304	0.25	66	843	0.11	135	284	0.37	94	442	0.08
ICG 12682	245	432	0.37	241	1000	0.27	226	552	0.30	187	615	0.22	125	329	0.28	40	620	0.11	169	379	0.28	28	451	0.09
ICG 12697	261	346	0.45	336	2101	0.44	171	275	0.45	217	436	0.33	137	237	0.35	59	542	0.15	170	255	0.41	75	166	0.36
ICG 12879	252	331	0.44	357	645	0.50	211	426	0.31	193	350	0.37	156	193	0.46	121	492	0.27	181	404	0.29	145	432	0.23
ICG 12921	129	391	0.26	245	761	0.34	267	267	0.51	312	470	0.26	106	335	0.24	68	587	0.15	171	180	0.41	44	407	0.08
ICG 12988	313	477	0.40	256	725	0.37	318	601	0.39	221	432	0.34	128	236	0.35	69	633	0.14	178	290	0.31	56	326	0.17
ICG 12991	311	407	0.44	395	867	0.44	292	383	0.47	316	498	0.39	159	252	0.39	82	427	0.23	171	210	0.41	150	442	0.19
ICG 13099	203	321	0.38	289	1884	0.22	302	328	0.47	245	425	0.18	84	262	0.24	104	621	0.19	162	358	0.36	112	482	0.15
ICG 13491	221	517	0.29	247	1066	0.28	270	460	0.36	210	547	0.28	81	329	0.18	87	865	0.12	136	351	0.33	85	415	0.15
ICG 13603	294	509	0.37	283	900	0.34	232	423	0.37	282	570	0.26	128	237	0.36	73	669	0.17	122	248	0.32	99	435	0.13
ICG 13723	244	325	0.42	332	1542	0.27	171	425	0.43	255	479	0.25	76	243	0.23	112	925	0.18	143	398	0.30	130	512	0.13
ICG 13787	257	455	0.39	196	1367	0.20	280	467	0.34	198	444	0.19	75	258	0.22	39	694	0.08	130	260	0.32	64	574	0.09
ICG 13856	302	362	0.47	272	786	0.36	284	608	0.28	237	570	0.27	129	226	0.36	83	547	0.20	177	425	0.27	88	334	0.17
ICG 13858	404	438	0.48	286	722	0.40	237	460	0.34	256	660	0.31	124	204	0.37	60	486	0.17	125	328	0.33	61	420	0.09
ICG 13895	373	522	0.42	369	1276	0.32	314	323	0.51	244	415	0.38	100	258	0.28	107	610	0.23	74	235	0.46	120	441	0.19
ICG 13941	355	601	0.38	357	831	0.41	239	343	0.45	270	417	0.42	141	254	0.37	60	725	0.11	157	224	0.39	154	274	0.26
TS 32-1	290	364	0.44	322	486	0.53	223	256	0.50	234	273	0.47	132	152	0.47	97	469	0.28	111	133	0.42	114	416	0.23
ICG-13943	357	485	0.38	342	877	0.40	170	343	0.45	247	404	0.30	130	242	0.37	127	1638	0.23	130	226	0.38	178	385	0.24

ICG 13982	442	605	0.41	249	953	0.30	204	465	0.35	210	573	0.20	119	254	0.32	78	822	0.13	195	379	0.34	71	484	0.05
ICG 14106	380	526	0.44	293	727	0.39	208	442	0.33	263	529	0.34	118	230	0.35	88	478	0.19	134	382	0.31	68	411	0.09
ICG 14118	367	591	0.38	242	656	0.35	222	338	0.39	193	610	0.22	125	230	0.36	63	604	0.14	168	305	0.34	99	436	0.13
ICG 14127	322	513	0.38	226	778	0.32	176	456	0.33	145	426	0.20	114	219	0.34	52	523	0.14	90	230	0.30	99	495	0.16
ICG 9346	278	335	0.50	334	628	0.47	224	268	0.49	286	494	0.39	140	176	0.45	96	392	0.29	131	126	0.41	137	483	0.22
RBB	247	283	0.47	426	699	0.50	207	198	0.53	255	380	0.42	151	183	0.45	93	537	0.21	125	146	0.44	139	453	0.19
ICG 14466	234	455	0.33	246	1327	0.24	321	520	0.38	242	527	0.23	95	282	0.25	69	601	0.16	182	338	0.37	66	396	0.10
ICG 14475	230	357	0.38	307	1294	0.28	276	481	0.39	214	357	0.22	75	257	0.23	56	728	0.11	163	314	0.35	145	473	0.13
ICG 14482	247	426	0.37	331	1227	0.32	244	347	0.48	242	548	0.30	75	289	0.24	71	912	0.11	163	311	0.39	120	350	0.09
ICG 14523	266	414	0.38	272	1658	0.22	277	358	0.44	170	528	0.16	92	274	0.19	60	895	0.10	177	371	0.33	71	462	0.09
ICG 14630	350	549	0.38	319	800	0.39	284	451	0.38	168	462	0.23	63	216	0.31	69	788	0.12	184	312	0.27	112	377	0.08
ICG 14705	405	507	0.45	299	624	0.44	226	385	0.44	265	367	0.42	97	158	0.34	56	569	0.14	180	287	0.40	99	418	0.24
ICG 14710	325	497	0.40	280	731	0.39	208	528	0.28	219	470	0.28	99	246	0.27	64	582	0.17	113	304	0.23	28	368	0.08
ICG 14834	235	433	0.36	307	1261	0.28	244	551	0.45	273	367	0.40	92	249	0.16	95	720	0.17	157	279	0.34	71	384	0.14
ICG 14985	417	444	0.44	435	871	0.45	174	286	0.45	233	442	0.32	52	235	0.36	127	563	0.26	167	241	0.41	121	488	0.12
ICG 15042	264	353	0.43	430	927	0.43	207	301	0.44	286	455	0.35	134	265	0.30	150	531	0.30	104	174	0.25	128	361	0.16
ICG 15190	170	362	0.33	269	1170	0.27	244	610	0.36	193	638	0.19	115	337	0.16	87	782	0.16	171	432	0.34	115	470	0.15
ICG 15232	247	413	0.38	418	1224	0.36	244	499	0.34	210	534	0.22	66	285	0.27	139	699	0.25	147	388	0.31	81	421	0.15
ICG 15233	152	292	0.33	225	984	0.27	150	420	0.37	206	449	0.31	116	222	0.33	26	456	0.08	115	255	0.32	72	563	0.08
ICG 15234	164	222	0.44	264	999	0.31	256	510	0.50	145	452	0.18	114	225	0.29	59	777	0.11	151	446	0.33	60	476	0.10
ICG 15236	269	435	0.38	256	1154	0.26	220	409	0.39	170	455	0.31	95	281	0.28	82	793	0.15	127	313	0.38	39	333	0.11

ICG 15287	369	508	0.42	378	716	0.46	226	358	0.43	211	377	0.35	114	294	0.31	69	535	0.16	152	206	0.40	81	490	0.12
ICG 15309	311	406	0.43	324	782	0.41	210	426	0.30	237	327	0.31	133	241	0.35	59	537	0.14	106	273	0.29	64	461	0.10
ICG 15379	263	273	0.50	388	1046	0.38	243	257	0.50	257	389	0.41	131	176	0.28	76	571	0.15	128	145	0.47	94	484	0.14
ICG 15380	330	416	0.43	322	1037	0.34	244	208	0.46	227	584	0.25	82	226	0.34	85	538	0.18	148	185	0.41	98	465	0.15
ICG 15384	283	457	0.37	442	1271	0.37	297	427	0.41	215	333	0.32	123	203	0.32	85	788	0.15	149	241	0.38	108	425	0.16
ICG 15386	280	458	0.37	366	1596	0.28	368	518	0.45	270	320	0.32	100	364	0.21	91	778	0.15	218	319	0.33	76	464	0.10
ICG 15387	256	445	0.37	292	787	0.38	216	373	0.38	274	688	0.26	99	190	0.34	72	694	0.15	92	262	0.31	59	402	0.09
ICG15390	261	357	0.41	307	771	0.39	164	308	0.39	147	354	0.29	105	192	0.35	71	455	0.19	83	192	0.35	107	511	0.17
ICG 15395	330	471	0.44	262	606	0.42	179	221	0.47	226	383	0.42	102	263	0.31	79	531	0.20	124	179	0.43	91	341	0.18
ICG 15396	243	322	0.43	293	789	0.38	199	424	0.35	253	381	0.40	121	190	0.32	72	598	0.16	118	256	0.33	107	456	0.15
ICG 15397	391	401	0.51	338	399	0.57	202	220	0.43	261	271	0.50	90	144	0.43	114	333	0.34	111	190	0.38	110	514	0.15
ICG 15398	333	496	0.39	273	660	0.40	231	528	0.33	217	368	0.34	109	222	0.34	42	565	0.13	187	249	0.28	38	310	0.11
ICG 15401	305	347	0.46	374	1384	0.31	206	339	0.42	265	569	0.31	115	197	0.35	96	710	0.18	92	221	0.19	73	279	0.20
ICG 15403	342	471	0.43	559	792	0.54	205	263	0.49	200	267	0.43	104	199	0.38	91	350	0.29	135	153	0.46	113	420	0.23
ICG 15405	218	346	0.39	326	1237	0.31	156	288	0.46	279	500	0.36	122	210	0.31	73	687	0.16	88	251	0.26	65	394	0.14
ICG 15415	414	510	0.46	446	1613	0.32	244	355	0.41	264	506	0.33	102	180	0.29	116	740	0.29	127	221	0.36	106	450	0.14
ICG 15419	327	570	0.34	255	2140	0.18							70	319	0.21	131	1143	0.17						
J 11	311	363	0.47	434	724	0.50	224	300	0.48	278	434	0.40	97	221	0.31	136	531	0.25	203	227	0.37	94	384	0.24
ICGV 01232	306	475	0.41	500	1177	0.45	225	419	0.42	286	449	0.40	98	196	0.37	64	541	0.19	174	223	0.40	81	235	0.25
ICGV 01276	280	408	0.41	384	616	0.50	266	286	0.49	263	366	0.42	123	220	0.35	81	414	0.26	143	167	0.47	100	191	0.32
ICGV 01328	296	537	0.35	347	903	0.38	253	376	0.44	168	394	0.26	120	270	0.27	68	538	0.17	140	210	0.39	123	341	0.16

ICGV 02022	233	302	0.43	278	795	0.38	211	367	0.40	238	372	0.39	102	182	0.42	94	551	0.22	107	177	0.37	86	277	0.13
ICGV 02038	284	379	0.41	346	583	0.50	162	259	0.43	236	381	0.38	134	196	0.39	69	512	0.28	125	256	0.38	98	326	0.20
ICGV 02148	124	347	0.38	307	659	0.44	184	243	0.41	248	461	0.36	128	226	0.28	71	659	0.18	134	188	0.36	132	396	0.23
ICGV 02189	348	490	0.41	297	720	0.40	184	426	0.39	286	357	0.41	88	255	0.39	82	577	0.16	171	202	0.30	91	424	0.16
ICGV 02194	281	588	0.32	233	837	0.31	186	454	0.34	168	627	0.26	163	286	0.23	40	568	0.09	111	211	0.29	39	444	0.06
ICGV 02266	350	428	0.49	493	1298	0.39	247	400	0.42	285	440	0.40	85	243	0.33	153	703	0.27	139	235	0.32	84	254	0.34
ICGV 02271	409	414	0.53	381	499	0.55	159	136	0.55	246	378	0.41	125	166	0.46	125	385	0.36	131	117	0.36	40	115	0.26
ICGV 02286	248	401	0.38	297	715	0.39	349	418	0.42	234	400	0.30	137	263	0.25	62	560	0.15	167	362	0.33	62	421	0.13
ICGV 02290	295	365	0.43	321	1139	0.34	273	279	0.50	257	464	0.28	90	244	0.30	58	540	0.15	189	277	0.44	109	287	0.13
ICGV 02446	221	403	0.35	308	1186	0.31	261	413	0.42	202	390	0.21	109	232	0.24	50	599	0.12	150	263	0.35	42	424	0.03
ICGV 87160	257	336	0.40	283	768	0.37	223	254	0.44	241	501	0.30	74	243	0.34	96	575	0.22	160	308	0.39	71	285	0.22
ICGV 91116	256	448	0.36	244	820	0.33	267	551	0.36	249	578	0.32	129	282	0.26	56	548	0.15	154	362	0.33	83	381	0.13
ICGV 94169	285	443	0.40	361	804	0.42	241	322	0.49	245	387	0.39	96	328	0.26	70	608	0.15	180	264	0.39	117	351	0.14
ICGV 94361	275	425	0.40	299	931	0.35	253	359	0.46	220	603	0.29	113	231	0.36	62	595	0.16	174	297	0.43	68	366	0.10
ICGV 95377	292	392	0.42	282	911	0.34	228	327	0.43	172	429	0.18	135	268	0.27	54	588	0.14	142	210	0.36	50	435	0.07
ICGV 96466	320	405	0.44	302	765	0.39	171	377	0.44	199	395	0.32	93	168	0.44	78	564	0.18	149	240	0.39	69	319	0.18
ICGV 96468	290	466	0.38	218	886	0.26	247	476	0.38	249	467	0.24	130	285	0.35	89	747	0.16	141	316	0.32	58	379	0.13
ICGV 97182	195	350	0.35	315	1045	0.35	284	389	0.45	249	437	0.36	150	236	0.36	95	538	0.22	229	296	0.44	123	420	0.20
ICGV 97183	249	327	0.44	356	1051	0.34	375	555	0.40	256	471	0.36	132	218	0.38	41	532	0.12	227	376	0.36	76	454	0.14
ICGV 98294	199	357	0.35	398	1202	0.35	252	437	0.37	195	334	0.39	134	245	0.29	42	776	0.08	111	293	0.31	112	471	0.15
ICGV 99001	174	416	0.30	208	965	0.26	164	460	0.40	265	486	0.32	100	283	0.19	43	639	0.08	89	320	0.26	32	420	0.05