Evaluation of Bread Wheat (*Triticum aestivum* L.) Genotypes for Yield Potential and Related Traits Under High Temperature Stress Condition at Middle Awash, Ethiopia

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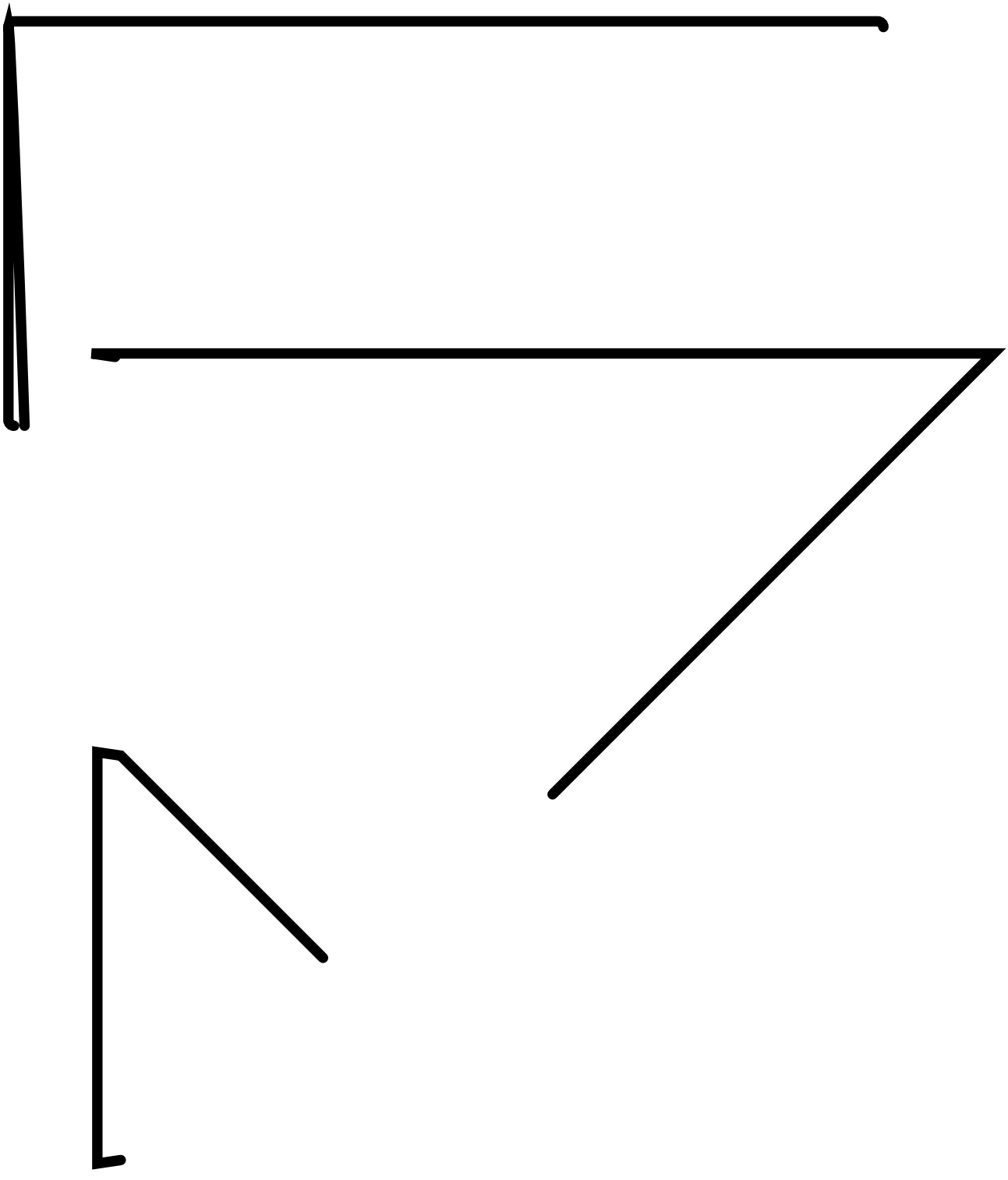

characterized by unpredictable and uneven distribution with annual average rainfall about 571 mm which is not for crop

Fentalle and G-18 shown to head and mature early, indicating to escape high temperature stress condition. With agreement to this study

24	G-24	6^{b}	60.66^{bcd}	89.33^{e-i}	28.66^{ghi}	67.4^{a-f}	8.4^{cdef}	14.06^{efg}
25	G-25	6.33^{b}	64^{a}	98.33^{a}	34.33^{a-f}	65.06^{a-g}	8.2^{c-h}	15.26^{b-f}
26	G-26	6.33^{b}	47^{opq}	77.66^{no}	30.66^{d-i}	54.2^{h-m}	8.2^{c-h}	17.06^{ab}
27	G-27	7.33^{ab}	57^{e-h}	89.66^{d-h}	32.66^{b-h}	58.53^{e-l}	8.4^{cdef}	14.7^{d-g}
28	G-28	6.66^{ab}	60^{cde}	97.33^{ab}	37.33^{abc}	73.86^{ab}	8.06^{c-i}	15.66^{b-f}
29	G-29	7^{ab}	54.33^{g-j}	89.66^{d-h}	35.33^{a-e}	57.73^{f-m}	7.133^{f-k}	13.26^{g}
30	G-30	6.66^{ab}	47.33^{n-q}	81.66^{lmn}	34.33^{a-f}	48.53^{lm}	5.26^{l}	11.33^{h}
31	Amibara	6.66^{ab}	45.33^{pqr}	78.66^{mno}	33.33^{a-h}	57.46^{f-m}	7.66^{d-i}	13.86^{fg}
32	G-32	6^{b}	63.66^{ab}	94.33^{a-e}	30.66^{d-i}	64.8^{a-g}	7.73^{d-i}	15.4^{b-f}
33	G-33	6.33^{b}	57.33^{efg}	89^{f-i}	31.66^{d-h}	61.66^{c-k}	9.73^{ab}	16.06^{a-d}
34	G-34	6.66^{ab}	63^{abc}	97.66^{ab}	34.66^{a-e}	65.13^{a-g}	9.06^{abc}	15.2^{c-f}
35	G-35	6.66^{ab}	51^{klm}	84.33^{i-l}	33.33^{a-h}	56.8^{g-m}	6.4^{jk}	14.7^{d-g}
36	Werer-2	6.66^{ab}	58.33^{def}	84.33^{i-l}	26^{i}	62.6^{c-k}	6.8^{ijk}	14.06^{efg}
Grand Mean		6.67	54.52	87.39	32.97	61.91	8.04	14.99
CV (%)		12.07	3.16	3.09	8.07	8.5	8.06	6.21
Significance level$_{(CR\ at\ .05)}$		*	**	**	**	**	**	**

G=Genotypes, CV=Coefficient of variation, DE=Days to emergence, DH=Days to heading, DM=Days to maturity, GFP=Grain filling period, PH=Plant height, SL=Spike length, TT=Total tillers, ET=Effective tillers, NSSP=Number of spikelets per spike.

6	G-6	34.867^{b-h}	79.43^{fg}	32.5^{h-m}	47.6^{e-k}	6666.7^{d7}

Biomass yield, grain yield, harvest index and thousand kernel weight: mean biomass yield ranged between 4537 kg/ha and 9352 kg/ha with average of 6988 kg/ha. Genotype G-23 and G-1 had the highest and the lowest biomass yield respectively (Table 3). were seven genotypes G-2, G-7, G-16, G-17, G-23, G-28 and G-32 that scored higher biomass yield than the best released check variety Werer-2. Biomass yield is one of the required traits by agro-pastoral community for their livestock feed during dry season where forage is inadequate. of higher biomass yield genotypes might with the need of agro-pastoral community of study area.

Grain yield was ranged from 1282 kg/ha (G-27) to 3039 kg/ha (G-7) with mean value of 1969 kg/ha (Table 3). Grain yield had the most important traits in any bread wheat evaluation program especially under high temperature stress condition. From the current there were three genotypes G-2, G-7 and G-21 which had higher grain yield than the best performed check variety Werer-2 and majority of the genotypes had also high yielded than check varieties Fentalle and Amibara. results revealed that promising genotypes for yield under high temperature stress condition.

highest computed harvest index for genotypes was ranged from 15% to 36% with average value of 29% (Table 3). highest harvest index was recorded from G-9 (36%) followed by G-11 (35.9%), G-12 (35.9) and G-30 (35.5%) and the least harvest index were recorded from G-34 (14.6%) followed by G-25 (17.9%). Harvest index (HI) has been used to describe the proportion of harvestable biomass. were seven genotypes that had greater value of harvest index than check varieties Amibara, Fentalle and Werer-2 and also high yielder than the low recorded harvest index. Hence it is more when these genotypes were selected so as to promote the harvest index. mean thousand kernel weight was 28 g with range of 22 g (G-34) to 35 g (G-28) (Table 3). were thirteen genotypes that had higher thousand kernel weight than the involved released check varieties Fentalle, Amibara and Werer-2. Genotypes able to maintain high thousand-kernel weight under high temperature stress may possess a high level of heat tolerance [13].

Correlation

Grain yield of wheat is a complex traits which is by components such us plant height, spike length, number of spikelet per spike, Number of kernel per spike, biomass yield and thousands kernel weight. information about association among traits is an important aspect to start a breeding program as it various opportunities for the selection of superior genotypes having attractive qualities Ali et al. [14]. Correlation for traits present in Table 4. Days to heading showed positive and highly correlation with days to maturity, plant height, spike length, biomass yield which had indicated simultaneous improvement of these traits is possible. However, this trait revealed negative and highly association with harvest index and also correlation with the rest of the traits. Highly association between days to heading and plant height was also reported by Ali et al. [15]. Whereas, Degewione et al. [16] reported association of days to heading with traits. T e Deleas chra sess

Days to maturity displayed positive and highly correlation with plant height, spike length, and biomass yield. Whereas negative and highly association with harvest index and positive correlation with number of spikelet per spike, number of kernel per spike and yield/ha. However, this trait is negative

DH=Days to Heading, DM=Days to Maturity, GFP=Grain Filling Period, PH=Plant Height, SL=Spike Length, NSSP=Number of Spiklets Per Spike, NKSP=No. of Kernel per Spike, BY=Biomass Yield Kg/ha, TKW=Thousands Kernel Weight, YLD=Yield Kg/ha, HI=Harvest Index.

Table 4: Pearson's correlation among traits of bread wheat genotypes.

Conclusion

Based on this study performance of bread wheat genotypes under high temperature stress condition evaluated for their traits revealed highly between the genotypes for most traits and among genotypes were observed. In current results early genotypes with short grain period obtained that could be promising to escape high temperature stress condition. In addition to this low canopy temperature reading genotypes G-16, G-22, G-28 and G-32 in this study might be promising for developing heat stress tolerant variety. Among the studied genotypes the highest mean of grain yield/ha obtained from G-2, G-7 and G-21 were the most important genotypes for showing excellent performance on grain yield/ha 2479 kg/ha, 3039 kg/ha, 2409 kg/ha respectively than the best performed released check variety Werer-2 (2362 kg/ha). the availability of high yielding genotypes might be promising for development of heat stress tolerant genotype that could be exploited in future bread wheat breeding for high temperature stress condition.

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