

Impact of salt stress on diverse wheat genotypes for various morpho-physiological plant traits at early growth stages

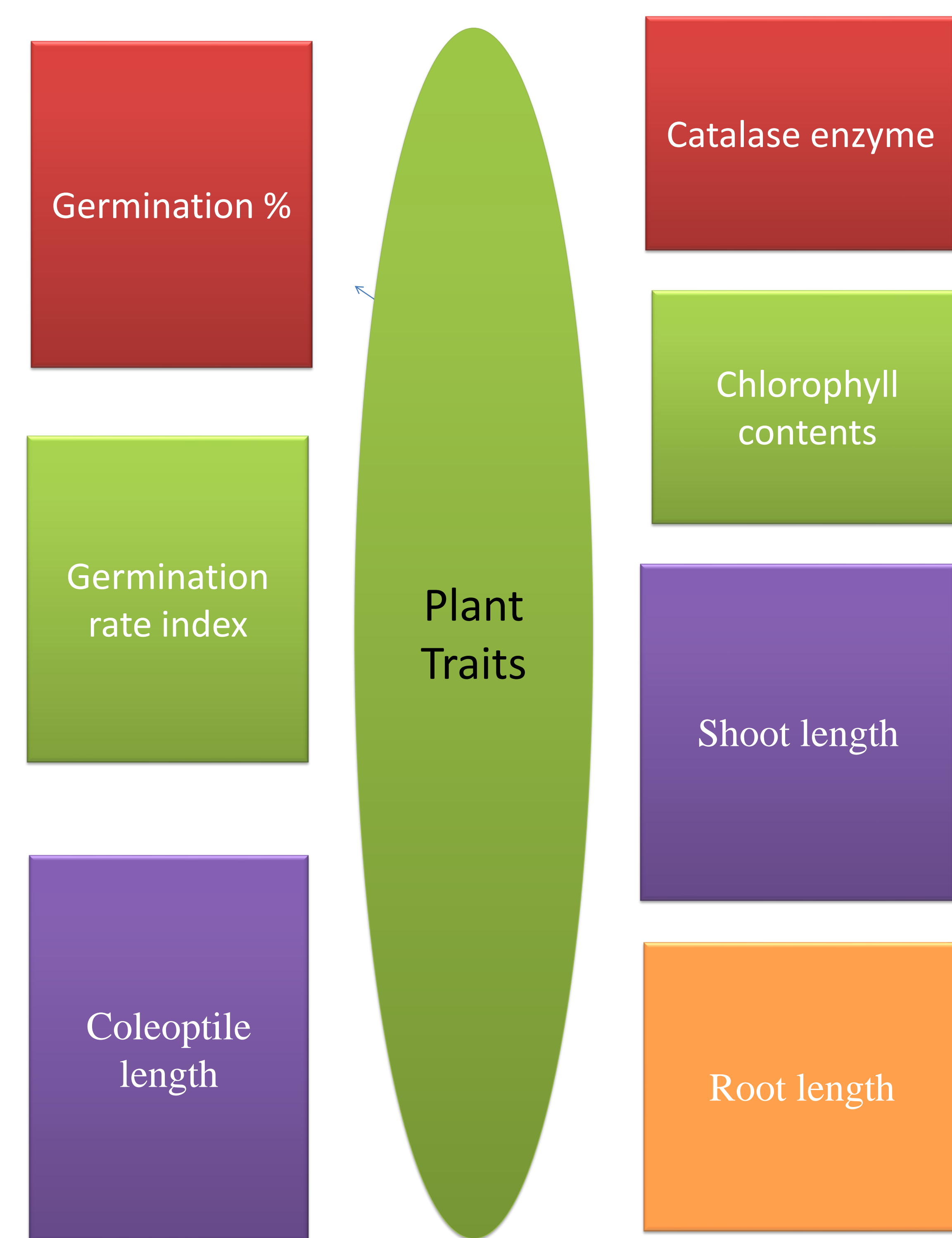
Shahzadi Mahpara* and Sidra Riaz

Department of Plant Breeding & Genetics, Ghazi University, Dera Ghazi Khan, Punjab, Pakistan

Abstract

Wheat output has decreased due to harsh environmental conditions. Salinity is the most damaging of these stressors in wheat crop development. Although there is a large amount of wheat germplasm available, testing in saline conditions is restricted. As a result, the current study evaluated the performance of 20 wheat genotypes under saline and normal circumstances. The current study was carried out at the Department of Plant Breeding & Genetics at Ghazi University in Dera Ghazi Khan, Pakistan, under lab conditions and green house conditions. The research was carried out in petri dishes and after 7 days of sowing, data were collected for germination %, germination rate index and then these were transplanted in earthen pots to determine seedling traits at germination stage. All genotypes, treatments and interaction showed significantly difference for all traits studied in analysis of variance. Genotypes A8 and A12 showed best performance for most of the traits studied. Correlation analysis indicated that positive and significant association was found between traits like germination percentage, germination rate index and coleoptile length to increase growth of the plant. So, two genotypes A8 and A12 have been identified as salt tolerant when compared with other genotypes under experiment. So, these genotypes, A8 and A12 can be used as parents for hybrid wheat program and wheat varietal development program to increase pe acre yield of the crop at maturity.

Materials and Methods: The study was performed under lab at room temperature and green house conditions in Dera Ghazi Khan, Pakistan. Seeds of 20 genotypes were surface sterilized for 10 minutes with 1.5 percent sodium hypo chloride and then washed with tap water. For both treatments, five seeds of each cultivar were sowed in 10 cm sterile petri dishes using filter paper (Whatman No.01) as the substrate with salt solutions(5% Na Cl) and normal water treatments replicated thrice and data at germination stage were recorded. These plants were also grown in earthen pots to collect data on seedling traits when plants were 3 weeks old under both treatments replicated thrice: These traits are following:



Results

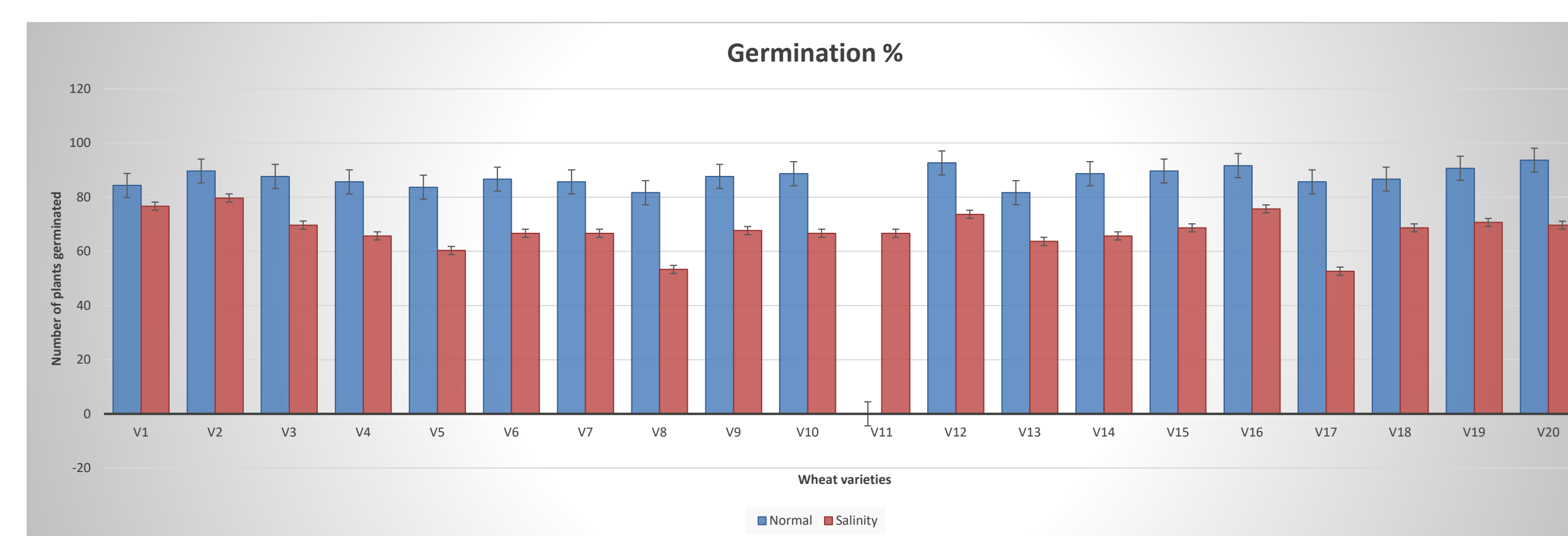


Fig.1. Mean performance of different wheat varieties under normal and salt stress for germination percentage

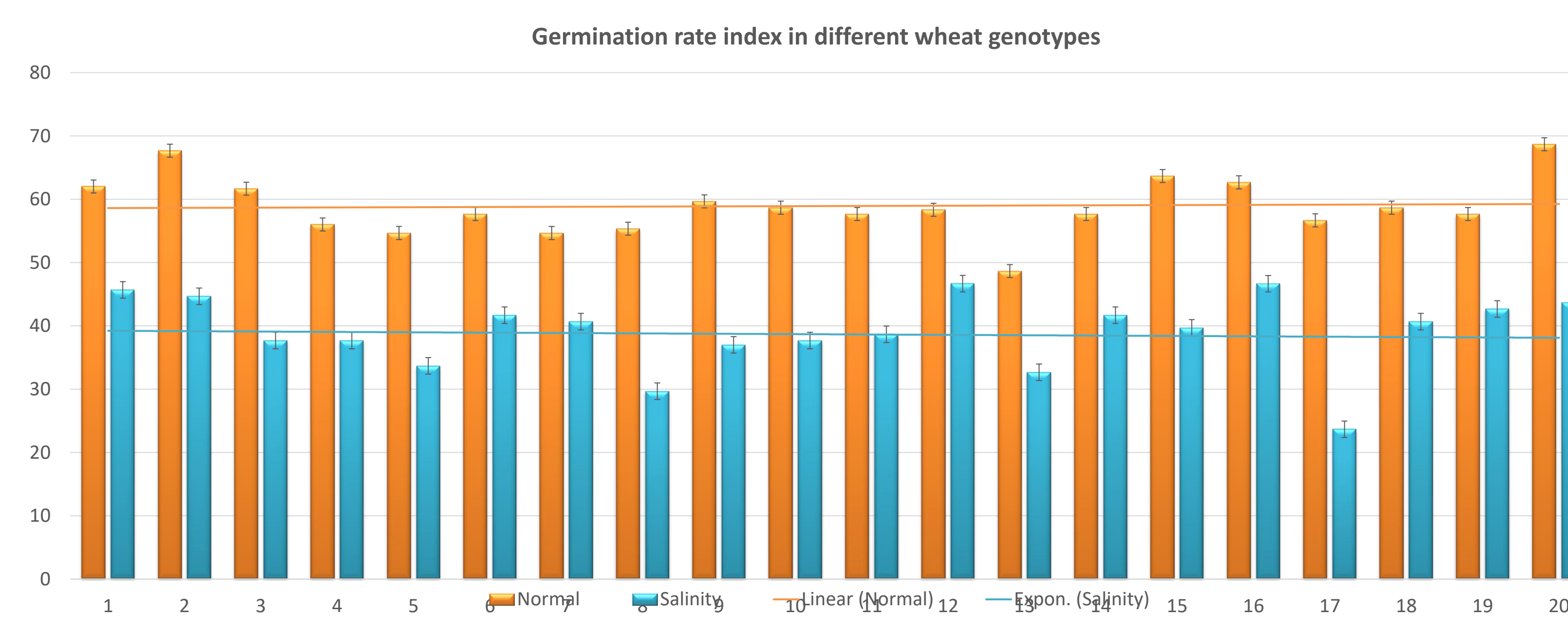


Fig.2. Germination rate index for various wheat varieties under both treatments

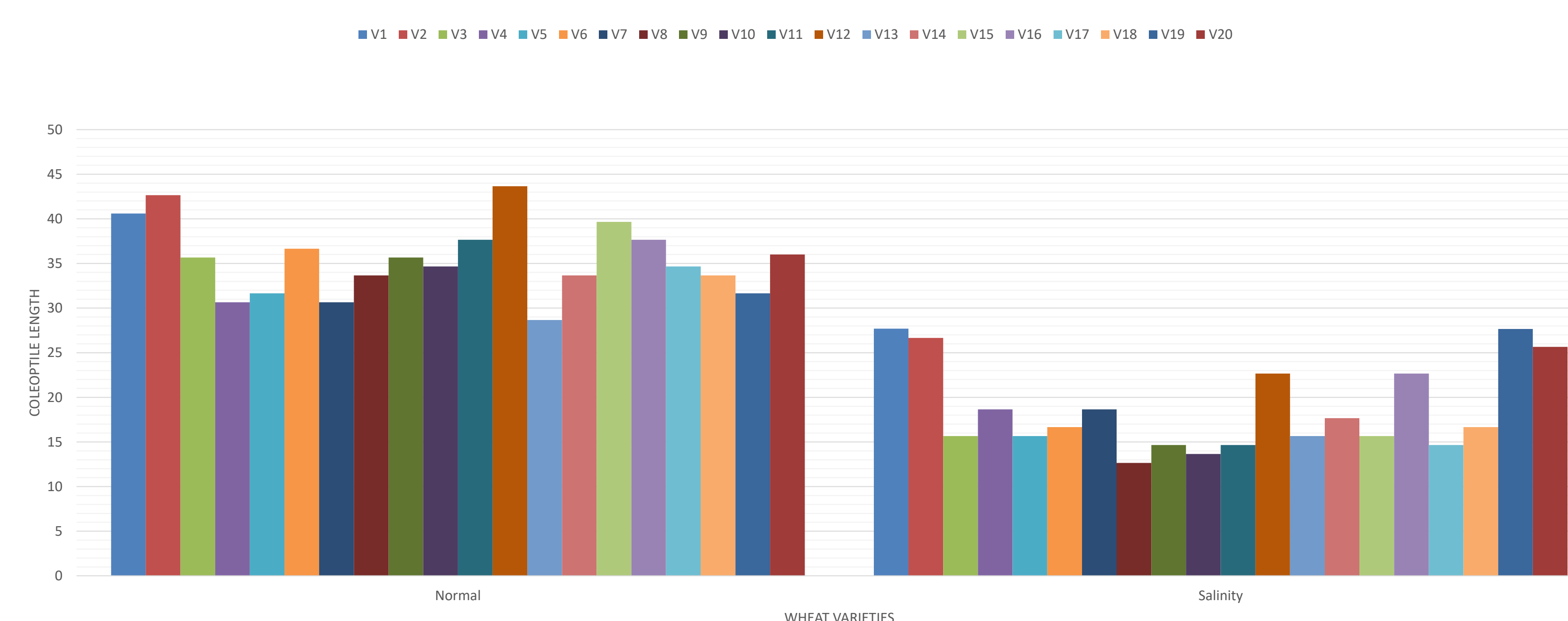


Fig.3. Mean performance of different wheat varieties for coleoptile length

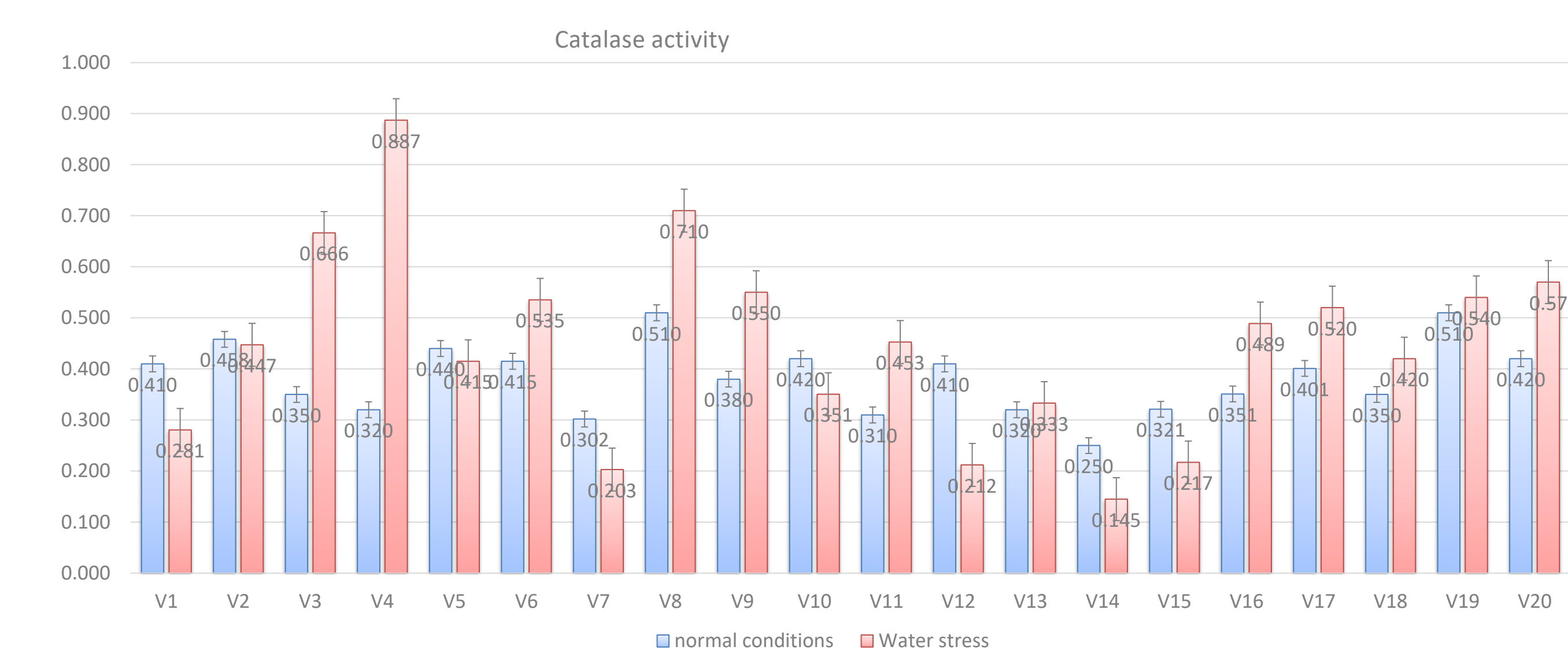


Fig.4. Catalase activity of different wheat varieties conditions

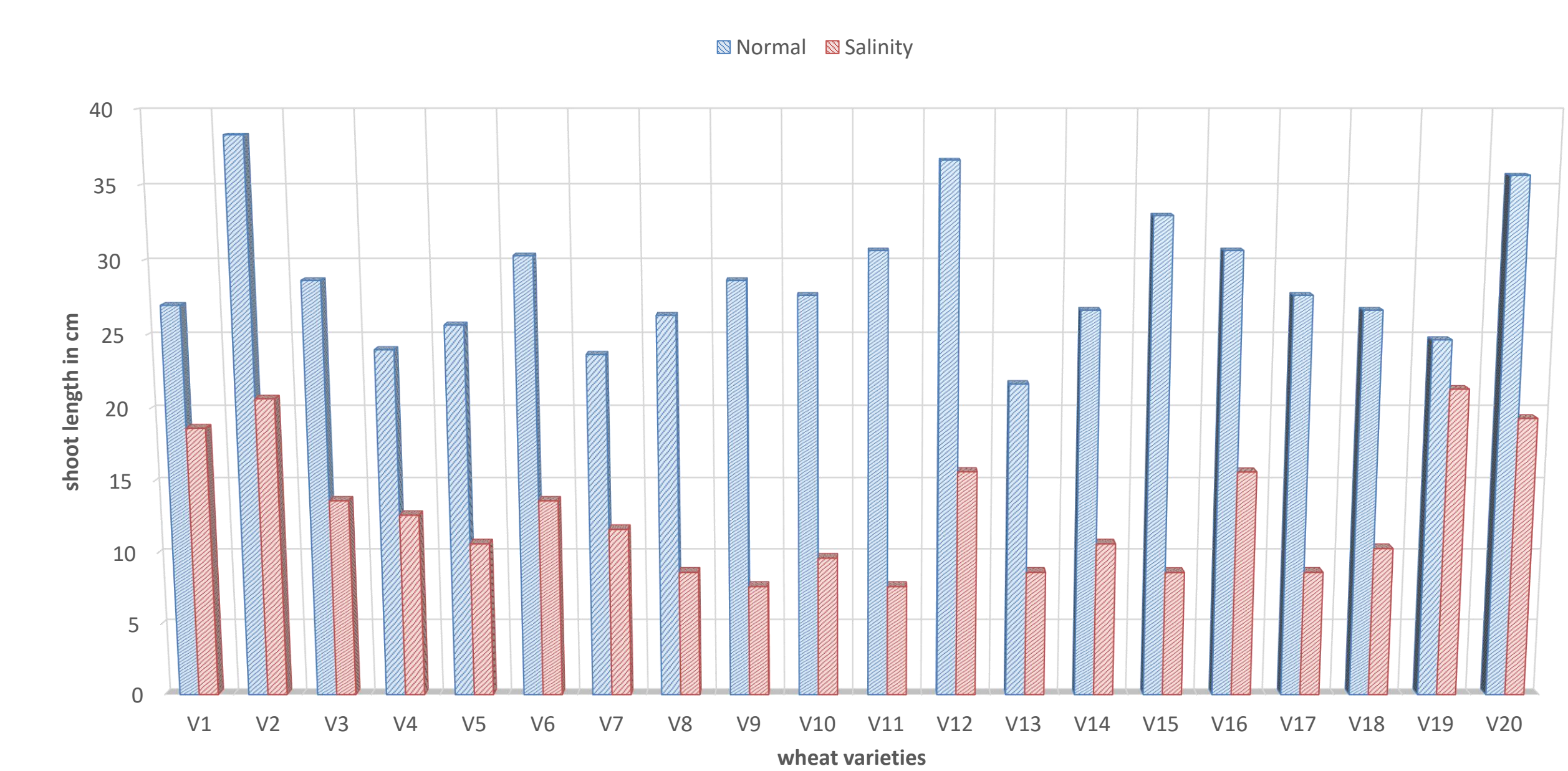


Fig.5. Catalase activity of different wheat varieties conditions

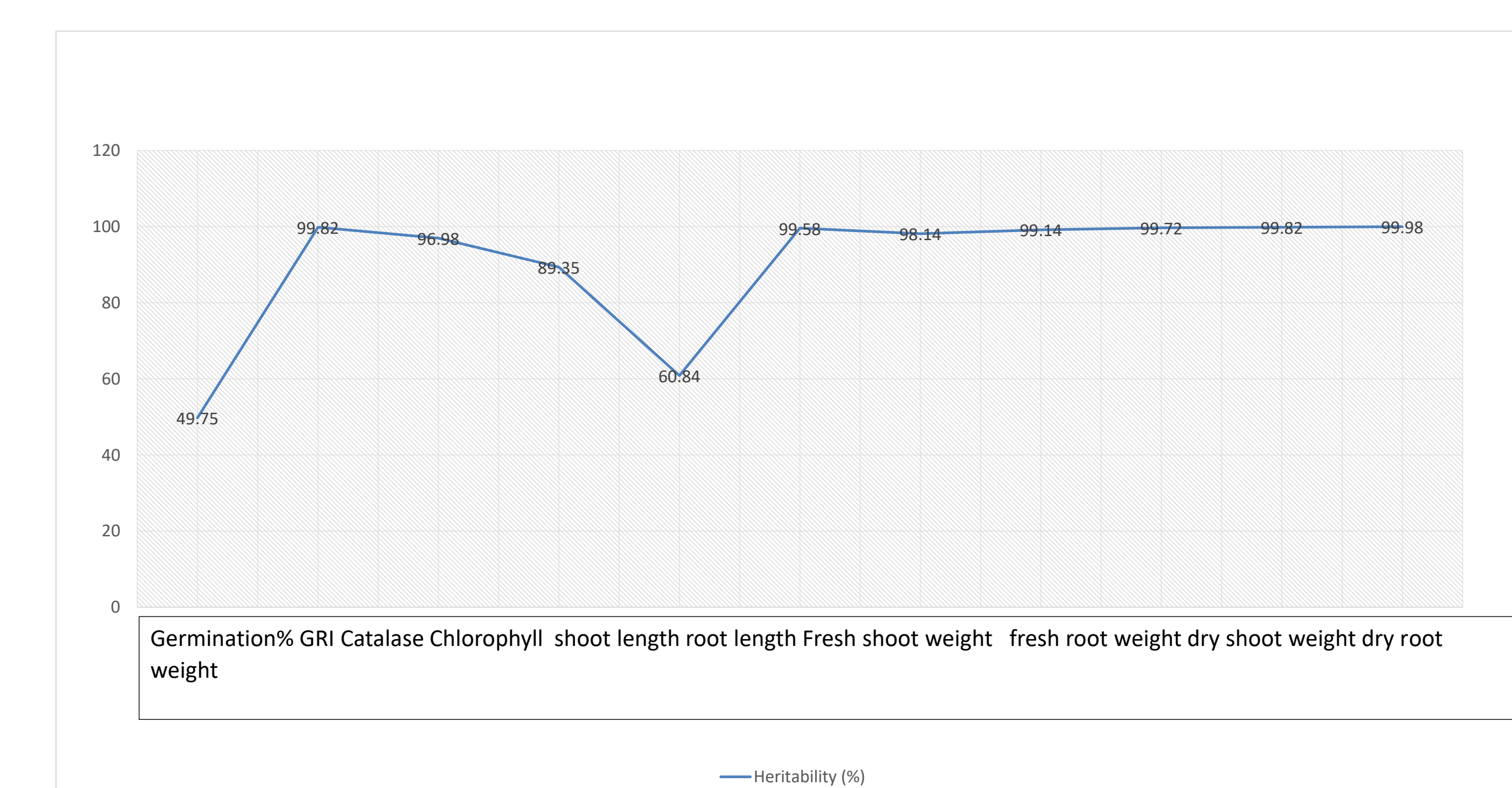


Fig.8. Estimations of heritability for various plant traits in wheat.

Conclusion

It is concluded that all genotypes were significantly different from each other. Genotypes comparison with check wheat varieties revealed that genotypes including V20 (A8) and genotype V6 (A12) performed best for most of plant traits including germination percentage, coleoptile length, chlorophyll contents, shoot length and root length etc. Maximum heritability was exhibited by germination rate index, followed by more shoot and root length with high genetic advance (%). Similarly high heritability was shown by chlorophyll contents, fresh shoot weight, fresh root weight etc. under lab and green house conditions. So these genotypes are proposed as best parents for hybrid wheat production and future wheat breeding programs.

References: Mahpara, S., Z. Ali., M. Ahsan. 2008. Combining Ability Analysis for Yield and Yield Related Traits among Wheat Varieties and their F1 Hybrids. Int. J. Agri. Biol., (10)6: 299-306..

Presented at:

Borlaug Global Rust Initiative Technical Workshop, BGRI-2022 organized by Cornell University, Ithaca, New York, USA