

AGRONOMIC, BIOCHEMICAL AND PHYSIOLOGICAL RESPONSES  
OF SOME SPRING WHEAT (TRITICUM AESTIVUM L. EM  
THELL) CULTIVARS TO DROUGHT STRESS  
AT REPRODUCTIVE STAGE


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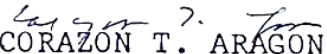
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The thesis attached hereto, entitled "AGRONOMIC, BIOCHEMICAL AND PHYSIOLOGICAL RESPONSES OF SOME SPRING WHEAT (Triticum aestivum L. em Thell) CULTIVARS TO DROUGHT STRESS AT REPRODUCTIVE STAGE", prepared and submitted by GOKARNA BAHADUR GHARTI-CHHETRI (G.C.) in partial fulfillment of the requirements for the degree of Master of Science (Agronomy) is hereby accepted.

  
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## ABSTRACT

GHARTI-CHHETRI (G.C.), GOKARNA BAHADUR, University of the Philippines at Los Baños, October 1985.  
Agronomic, Biochemical and Physiological Responses of Some Spring Wheat (*Triticum aestivum* L. em Thell) Cultivars to Drought Stress at Reproductive Stage.

Major Professor: Dr. Joveno S. Lales

Wheat crops are most likely to experience drought after anthesis under most growing conditions in the humid tropics.

Nine spring wheat cultivars (seven from Nepal and two from the Philippines) grown in pots were exposed to 4, 8, 12 and 16 days of water stress starting at 50% head emergence by withholding water under glass house conditions. The treatments were arranged on a two-factorial in Completely Randomized Design, replicated four times. Concurrent measurements of leaf water potential (LWP), upper ( $R_u$ ) and lower leaf surface ( $R_l$ ) stomatal resistances of flag leaf; soil moisture content (SMC) and nitrate reductase activity (NRA) determination were made through

a 16-day period after cessation of irrigation. Free proline was determined from the same flag leaves. Grain protein content, yield and its components were also determined.

Highly significant variety x stress duration interaction effect was observed on stomatal resistance ( $R_s$ ), LWP, NRA, grain weight, harvest index (HI), SMC but it was not significant in number of grains/spike. NL 370, NL 496, NL 292 and Siddhartha exhibited drought avoidance by maintaining relatively higher LWP under water stress.  $R_s$  increased more on the lower than in the upper leaf surface under drought stress. Lerma 52, Triveni and Trigo 1 had sharp rise in their  $R_s$  even at mild stress in contrast to other varieties which had gradual increase in  $R_s$  as the drought progressed. Early maturing cultivars, namely: NL 496, NL 370, Siddhartha and NL 292 had higher NRA than late-maturing cultivars under both stressed and non-stressed conditions. NRA decreased with increase in drought duration. Leaf proline and grain protein content increased as the drought progressed. Leaf proline had significant correlation with LWP ( $r = -0.80^{**}$ ), SMC ( $r = -0.48^{**}$ )

and  $R_s$  ( $r = 0.56^{**}$ ). Grain protein had strong negative correlation with SMC, LWP, grain filling duration and 100-grain weight. NL 496, NL 370, NL 292 and Trigo 2 had the higher SMC under different drought durations. Drought enhanced maturity and grain filling duration. Early maturing cultivars had longer grain filling duration than late-maturing ones. Drought affected the number of grains/spike and 100-grain weight. Genotypic variability in grain set was noted under water stress. Lerma 52 gave the highest but Siddhartha and NL 292 gave the lowest biological yield under water stress. Trigo 1 and Trigo 2 gave the highest grain yield under non-stress condition while Siddhartha, NL 292, NL 370 and NL 496 produced the maximum grain yield and also HI under stressed conditions. Considering the responses under different drought stress, early maturing namely: Siddhartha, NL 292, NL 370 and NL 496 are classified as the drought resistant and mid, late-maturing namely: Trigo 1, UP 262, Lerma 52 and Triveni as the drought susceptible cultivars.

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