PAK. J. SOIL SCI., VOL. 10 (1-4), 1995

CHARACTERISTICS OF SPRING WHEAT (TRITICUM AESTIVUM L.) CULMS SURVIVED NITROGEN AND WATER STRESS

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ABSTRACT

This study was conducted to compare the effects of nitrogen and water stress on yield characteristics of specific tillers of spring wheat (Triticum aestivum L.). Three levels of N and three levels of water supply were established at the first node on the mainstem visible stage and maintained through maturity in growth chamber at 20° C constant day/night temperature. The photoperiod was 14 h with 400 µmol m^{-2} s^{-1} PPFD.

Grain yield of late-formed tillers was affected more than the grain yield of early-appeared tillers by N and water stress treatments and there was also a significant interaction between these two variables on yield of late-formed tillers. The interaction of N and water supply on kernel weight was also significant for mainstem tillers and all subtillers. Nitrogen deficiency significantly decreased the number of kernels/fertile spikelet of late-formed mainstem tiller T4 and subtillers T30, T21 and T12.

Index words: Triticum aestivum L. N stress, Water stress, Nutrient solution, Mainstem tillers, subtillers, Grain yield traits.

INTRODUCTION

Many studies have shown that nitrogen stress restrict the yield of wheat (Darwinkel, 1983; Morris and Paulsen, 1985; Bruckner and Morey, 1988 and Camberato and Bock, 1990). Several investigators have studied the combined effects of nitrogen and water stress on wheat yield (Parameswaran et al., 1984; Bauer et al., 1987; and Eck, 1988). These reports suggest that tiller density,

MATERIALS AND METHODS

A system which imposes a range of water stress levels developed by Snow and Tingey (1985) was adapted to grow wheat plants in growth chamber at 20°C constant day/night temperature. The photoperiod was 14 h with 400 µmol m^{-2} s^{-1} PPFD.

Details of nitrogen and water stress treatments are presented as under.

Nitrogen (mM):

N_o (Optimum N supply): 12

N_M (Medium N supply) : 06

N_L (Low N supply) : 02

Water:

W_o: Water table was maintained 4 cm below the root-screen interface and no ceramic plate was used.

W_M: Water table was maintained 12 cm below the root-screen interface and 1 bar high flow ceramic plate with flow rate of 50 ml/hr/cm^2; Soil Moisture Equipment Co., Santa Barbara, CA; Catalogue # 604 DO4-B1M3) was inserted between plant sleeve and top foam block.

W_L: Water table was maintained 12 cm below the root-screen interface and 1 bar standard ceramic plate with flow rate of 2