

SOIL MOISTURE CONTENTS AND CROP YIELDS AS AFFECTED BY TWO
ELEVATION POSITIONS WITHIN THE FIELD UNDER RAINFED CONDITIONS

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ABSTRACT

Barani areas crop yields are mainly constrained by factors like low and erratic rainfalls, severe soil erosion, improper land conditions and inappropriate soil and crop management practices. These conditions cause stress due to excessive wetness and/or drought under different situations and part of the year. A field study was conducted to document the elevation differences within the cropped fields and their effect on soil moisture contents and crop (wheat, maize) yields. The elevation difference in plots selected during 1993-94 ranged from 0.04-0.93 m and during 1995-96 varied from 0.21-1.15 m. The field undulations resulted in uneven soil moisture distribution. On the average the soil moisture contents in 0-15 cm soil depth at sowing of wheat was 35 and 29 per cent greater at lower position in the fields than higher position during 1993-94 and 1995-96, respectively. The increases in wheat grain yield at lower field positions over higher field positions were 185 and 125 per cent during 1993-94 and 1995-96, respectively.

INTRODUCTION

In Barani areas of Pakistan rainfall is the main source of water for crops/plants production. The productivity limitations in these areas mainly consist of low and erratic rainfall (occurrence and distribution), severe soil erosion, water shortage in Rabi and excess in Kharif, undulating fields and lack of proper soil and crop management practices. Although total

wheat and maize. Under undulating fields, during monsoon season the stress is caused because of excessive wetness on the lower positions. However, during winter season removal of water through surface flows cause drought stress at the upper field positions. Stone *et al* (1985) observed that in piedmont soils, during dry years, the land scape positions those received water from higher elevations produced the highest yields. Daniels *et al* (1985) stated that in piedmont soils the interrelationships between land scape position and erosion class and among land scape position, growing season moisture and crop yields, create difficulty for quantifying the effect of erosion on soil productivity.

Arnon (1972) reported that in the mild winter rainfall regions the young plants may suffer either from waterlogging or drought in some years/season or region. In the semi arid areas with summer rainfall the amount and distribution of rainfall that occurs during the growing season of the wheat crop are generally inadequate. Hence reserve supplies of stored soil moisture prior to sowing are essential for satisfactory wheat production.

Robertson (1985) classified the soils as dry when soil water contents are less than 50 per cent of the total available soil water. Below this value crops will suffer an increasing degree of water deficiency. The 0.20 m layer of soil was assumed to be dry for seed germination purpose