Chapter I.

Introduction

The long-term sustainability of agricultural production in the sloping piedmont region of Virginia and North Carolina is a major concern due to excessive soil loss resulting from agricultural activities (Trimble 1974). Although producers in the region readily use conservation practices such as sod waterways, terraces, and contour planting for soil erosion reduction, Langdale *et al.* (1979) indicated a minimal decrease in soil loss. Kramer (1986) indicated a balance of production and use of conservation practices for this cropland must be established and maintained for future agricultural production.

The Food Security Act of 1985 provided for a balance of crop production and soil conservation by requiring all producers farming highly erodible cropland to implement and maintain a conservation compliance plan for United States Department of Agriculture (USDA) farm program benefit eligibility (Cook 1984). Although the final implementation deadline of this act was not until 1995, soil savings were quickly observed. The 1992 Soil Conservation Service (SCS) National Resources Inventory (1994) indicated a 25 percent decrease in cropland soil erosion induced by water during the period of 1982 to 1992. Kellogg *et al.* (1994) primarily attributed this decrease to the farm bill provisions, but indicated additional soil savings resulted from an increased producer exposure to conservation practices and the subsequent application to their non-highly eroded cropland.

Many types of soil conservation practices exist for reducing soil erosion, but selection depends primarily on farm topography, operation size and present degree of

erosion. Practices include contour planting, sod waterway construction, and terrace formation. Although these practices are effective for reducing soil erosion, they can be prohibitively expensive, limit the use of large multiple row equipment, and remove workable land from production. Moldenhauer and Lovely (1971), and McGregor *et al.* (1975) noted the difficulties associated with use of these conservation practices, especially by producers using large tractors and multi-row equipment. Attractive alternatives to the use of conservation structures and/or modification of field design primarily comprise conservation tillage production practices.

Conservation tillage is a residue management system in which a crop is planted into a herbicide killed sod or mulched soil using minimal soil disturbance (Link 1984). The United States Department of Agriculture Natural Resource and Conservation Service (1992) defines conservation tillage as a tillage and planting system that leaves at least 30 percent of the soil surface covered by mulch or a previous year's crop residue at planting. Unger (1996) describes conservation tillage as a broad-spectrum tillage technique encompassing mulch tillage, reduced tillage, minimum tillage, no-tillage, and strip-tillage. Although these tillage systems utilize different degrees of soil disturbance, all maintain a minimum of 30 percent soil surface residue cover immediately after crop planting. For example, no-tillage involves the planting of a crop directly into a killed cover crop residue or sod using minimal soil disturbance. In contrast, strip-tillage involves the intensive cultivation of a narrow strip into which a crop is subsequently planted but the area between crop rows is undisturbed.

Although conservation tillage has gained widespread use for both grain and forage crop production, the acceptance for tobacco production has been limited despite research efforts since the late 1960's. Shear (1968) reviewed the development of no-tillage crop production in the United States and indicated potential use for tobacco production. Moschler *et al.* (1971) subsequently conducted investigations using both burley and flue-cured tobacco, but unacceptable yield reductions and tobacco quality issues indicated the need for additional investigation. Subsequent researchers (Morrison *et al.* 1973; Zartman *et al.* 1976; Chappell and Link 1977; Link 1984; Shilling *et al.* 1986; Wood and Worsham 1986; and Wiepke *et al.* 1988) observed similar results which limited the widespread adoption of the production practice. The recent developments of improved transplanter technology (Morse *et al.* 1993) and an improved herbicide have renewed interest in conservation tillage tobacco production.

To evaluate the promise of this new transplanter and improved herbicide, two research studies were initiated in 1995 at the Virginia Tech Southern Piedmont Agricultural Research and Extension Center in Blackstone, Virginia. The objectives of these studies were to:

1. evaluate the effect of row cultivation treatment on soil erosion, yield and quality of five conservation tillage flue-cured tobacco production systems and a conventional tillage system.
2. determine the sand, silt and clay composition of collected soil erosion.
3. study the impact of various cover crop mulches on the yield and quality of conservation tillage produced Virginia dark-fired tobacco.

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