

SECTION 3

The Effects on Spring Wheat Yields

3.1. Introduction

In this section we consider the effects of the same three climatic scenarios (a warm period, a cool period, and a “2 × CO₂” climate) on spring wheat yields.

Winter wheat can be grown only in a small area in southwestern Finland, while spring wheat extends over much of the south and center of the country, covering 0.10–0.15 mha (*Figure 3.1*). Average yield rose from 1000–1500 kg/ha to 2500–3000 kg/ha between 1920 and 1983, largely a result of plant breeding, better cultivation techniques and increased use of fertilizers.

At present, average spring wheat yields of marketable quality are highest (2400–2500 kg/ha) in southwestern and southeastern Finland (*Figure 3.2*). In the best years the yield rises to 3400–3500 kg/ha in southern Finland and 2800 kg/ha in the north. In poor years, the yield falls to about 1700 kg/ha even in the most productive regions. High yields are found on the west coast as far north as 63° N, crops being grown there on the best arable land (*Figure 3.2*).

Most of the spring wheat cultivars grown in Finland are of domestic or Scandinavian origin, and are suited to short, cool summers. Their growing period is about 110 days. The earliest varieties require an ETS of about 900 degree-days and the latest varieties 1110 degree-days (Mukula *et al.*, 1977a; Kontturi, 1979). In general, varieties with the highest yields are those requiring the longest growing time but only, of course, when the growing season is sufficient for the variety to ripen. For example, while late cultivars (which have a higher yield than early ones) are preferred in the south of Finland because of the region's longer growing season, the yield of these cultivars in a cool year drops more than that of early-maturing cultivars.

The quality of spring wheat depends to a large extent on weather conditions during the harvesting season. Since the major component of wheat endosperm is starch, at least one of the enzymes of the grain may be expected to be

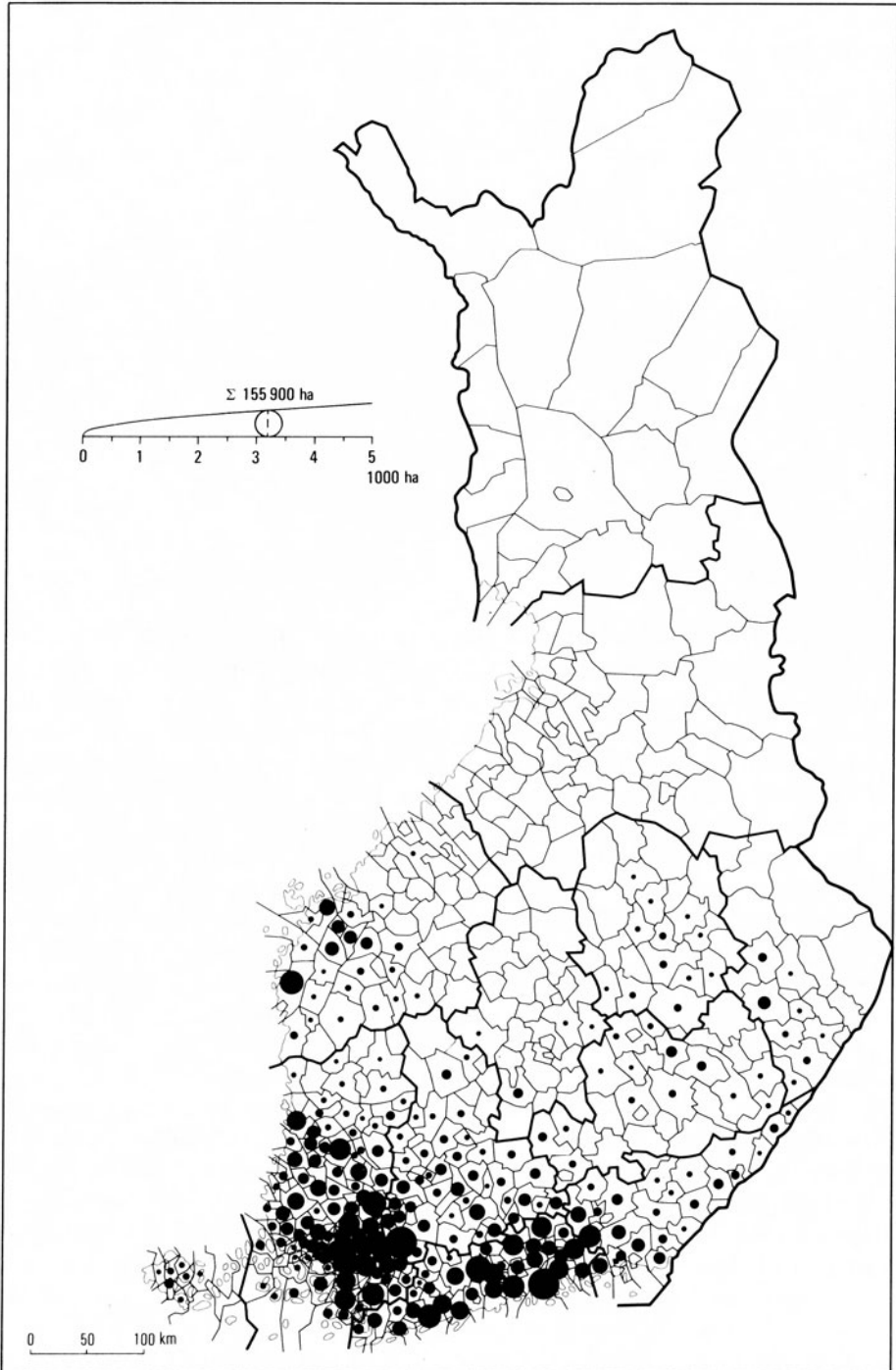


Figure 3.1. The distribution of spring wheat cultivation in Finland by municipality (*Atlas of Finland*, 1982).