

Chapter 1

INTRODUCTION

Apple (*Malus domestica* Borkn.) originated in Southwestern Europe and the Caspian Sea area (Scheer, 1969). It is one of the most important temperate fruits in the world. The cultivated area of apple is the highest of the total fruit tree area and its production is the second highest of the total fruit production in the world (FAO, 1993).

Yunnan is located in southwestern China, with longitudes between 97°39'E and 106°12'E and the latitudes between 21°09'N and 29°15'N (Zhang, 1989). Apple are cultivated in three zones: Northwestern temperate deciduous fruit zone (I), Central-Northeastern deciduous-evergreen mix fruit zone (II) and Southern tropical-subtropical evergreen fruit zone (III) (Figure 1.1). About 99% of high quality apple are obtained in zone II and III since they have suitable conditions for growing apple: the elevation range from 1900 m to 2700 m; annual average temperature is 13 °C - 14 °C; growing degree day is 3600 °C - 4300 °C (>10°C) (Zhang, 1989).

In 1994, the cultivated area of apple in these 2 zones accounted for 30% of total fruit tree area and the total amount of apple production was 52,068 ton (YSO, 1994). The top 3 apple producing districts in these 2 zones are Lijiang, Zhaotong and Kunming having production areas accounting for 43%, 37% and 12% of total apple area, respectively. Golden Delicious apple is the main apple cultivar grown in these 3 districts and its production accounted for 32% of total apple production (Yang, 1994).

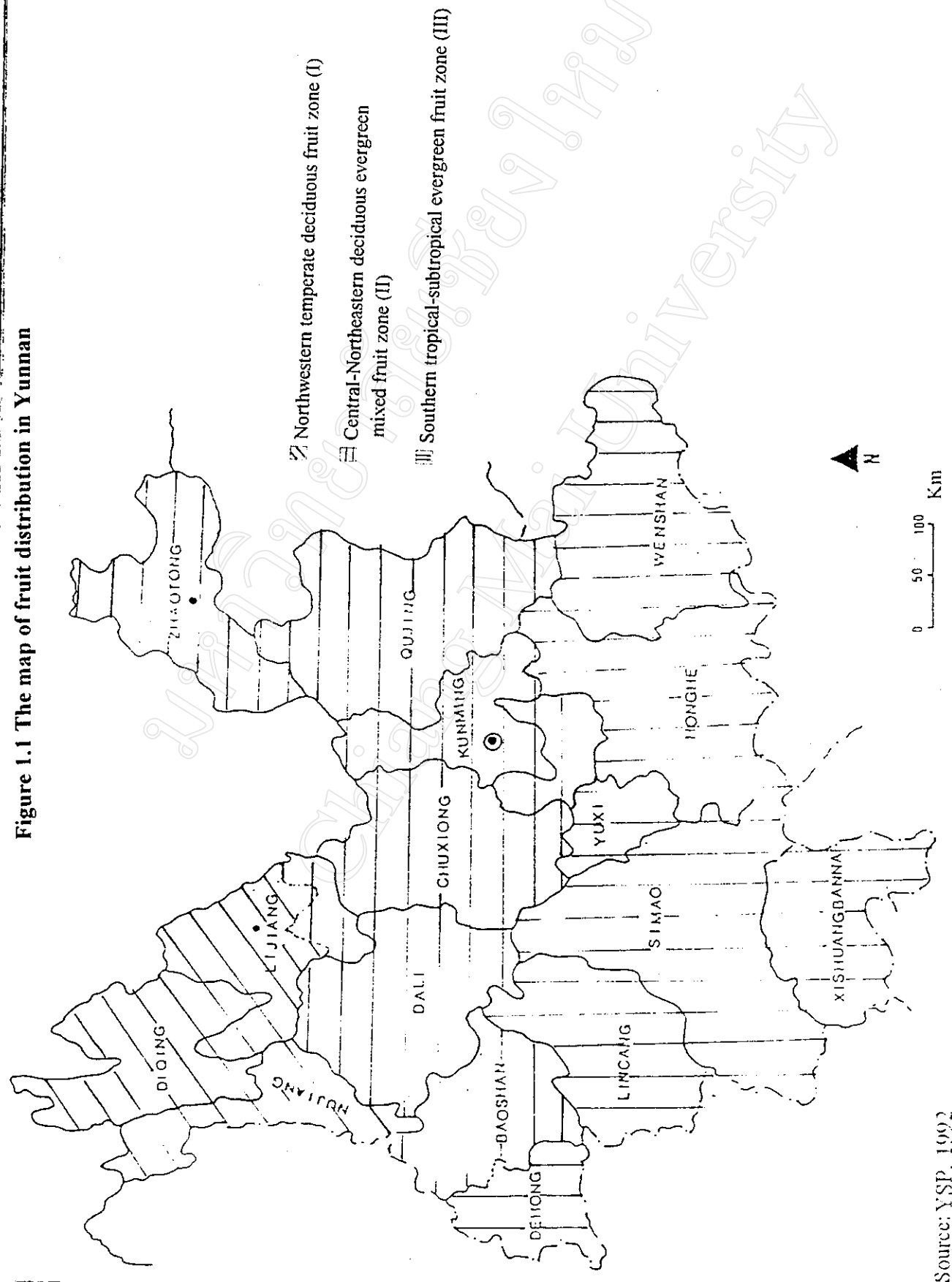
Exported apples in 1994 only accounted for 0.7% of total apple production in China due to low quality fruit (Xin, 1994). In Yunnan, apple fruit with low quality comprised 45% of total production. Low quality fruit had poor color and small size (Yang, 1994).

Low fruit quality might be caused by many factors, such as unfavorable climate conditions, water stress and nutrient disorder. As mentioned earlier, Yunnan has suitable conditions for producing high quality fruit so that climate conditions should not be a factor causing low fruit quality.

Boron (B) deficiency might be one of the factors limiting apple fruit quality since B deficiency symptoms such as internal and external cork formation in apple fruit and small fruit size are commonly seen in orchards and on fruit on sale in markets in Yunnan. In addition, low soil B being lower than 0.5 mg kg^{-1} covered about 90% of the agricultural land in Yunnan province (SFS, 1991). Furthermore, according to my previous survey in Yunnan, B concentration in the youngest fully expanded leaves (YFEL) at harvest of Golden Delicious apple was 15 mg kg^{-1} dry wt. being equal to the minimum leaf B concentration in the marginal range ($15\text{-}20 \text{ mg kg}^{-1}$ dry wt., Robinson, 1986).

This thesis aims to 1) evaluate effects of B fertilizer on apple B status and fruit quality; 2) establish the relationship between apple B status and fruit quality.

Figure 1.1 The map of fruit distribution in Yunnan



Source: YSP, 1992