Taro leaf production in northern New Zealand

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Abstract

Young leaves, suitable for production of palusami and other traditional tropical dishes, have been harvested from plants growing in tunnel houses in the Pukekohe district since January 1998. Monthly fresh leaf production from the houses has ranged from zero to 1000 kg between January 1998 and December 2005. Low monthly yields of less than 100 kg were obtained from mid-winter to early spring in most years. There was a linear relationship between growing degree-days above 10°C in a month and monthly leaf production. Recommendations for obtaining higher leaf yields from mid-winter to early spring include increasing greenhouse temperatures, using raised beds and possibly utilising cool-tolerant Japanese cultivars when they become available.

Additional keywords: temperature, degree-days, thermal time, *Colocasia.*

Introduction

Young leaves of taro (*Colocasia esculenta* (L.) Schott) are widely used for the preparation of palusami and other traditional dishes in tropical countries (Purseglove, 1972). They are cut from maturing crops in the last few weeks before corms are dug. In wet South Pacific tropical islands, a supply of young leaves is generally available year-round because crops can mature year-round. Many Pacific islanders in northern New Zealand have continuously harvested young leaves between late spring and autumn as they develop to the desired stage on plants grown in their home gardens. These New Zealand grown plants do not produce mature corms, even when leaves are not harvested during the growing season (Bussell and Goldsmith, 1999).

Since 1998, members of a Pacific Island trust have been growing taro plants in unheated plastic tunnel houses and selling young leaves harvested from them at the Otara market in Manukau City (Bussell *et al*., 2003). Leaf production and its relationship to temperature is described and discussed in this paper. Possibilities for year-round production and improving mid-winter to early spring yields are also discussed.

Materials and Methods

Cormels (suckers) of the New Zealand cultivar termed variant RR and the South Pacific cultivars Niue and Ni Tonga were planted during winter and spring 1997 in unheated tunnel houses at the Kahoa Tauleva Trust property near Pukekohe. They were planted in flat beds with 6 rows c. 15 cm apart and with plants c. 15 cm in the row. Most of the original plants were removed in winter 2004 and new cormels planted. Composted sawdust and blood and bone were applied and worked in before each planting. Blood and bone was also applied annually in winter. The crop was irrigated as required and was not subject to water stress.

The weight of young leaves harvested each month has been recorded since January 1998. Monthly yields to December 2005 were plotted against degree-days in each month above 10 °C, a base temperature used in recent Hawaiian taro growth studies (Miyasaka *et al*., 2003).

Table 1. Years with less than 100 kg leaf yields (fresh weight) in July, August or September.

Month	Years
July	1998, 1999, 2000, 2001, 2005
August	1998, 1999, 2000, 2001, 2003, 2004, 2005
September	1998, 1999, 2000, 2001, 2004, 2005

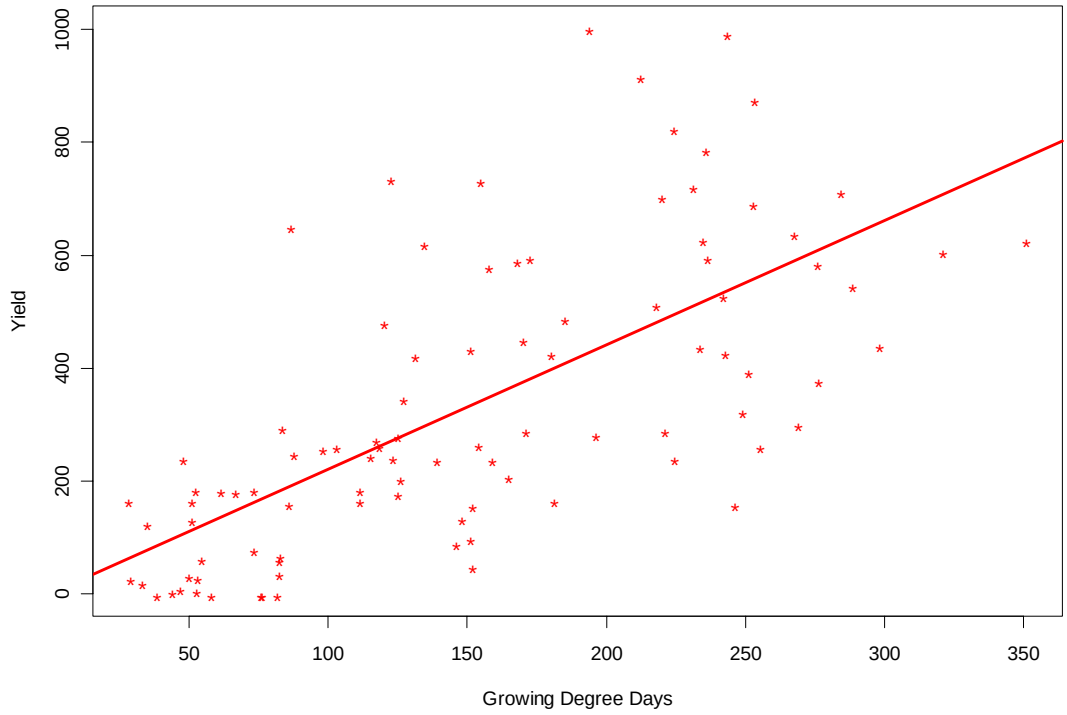

Figure 1. Monthly yield (kg) of taro leaves (fresh weight) in response to monthly growing degree-days (base 10°C)

Results and Discussion

Low leaf yields of less than 100 kg in a month or no leaves at all were obtained from the site in July, August and September in most years (Table 1). A low yield was also obtained in June and October 1998. The highest monthly yield was 1002 kg in December 1999. There was a linear relationship between yield of leaves harvested per month and degree-days in each month above 10 °C (R^2 = 79.6%) (Figure 1). For an increase of 10 GDD above 10 °C there was a calculated yield increase of 22 kg (se 1.2, p-value < 0.001) from the site. Yield from the site was considered satisfactory except between July and September in most years.

Raising air temperatures in an improved greenhouse, for example a double-skinned plastic house with ducted warm air heating, may be the most practical and economic way to increase mid-winter to early spring leaf production. Raising soil temperatures through having raised beds rather than flat beds in the greenhouse may also contribute to improved leaf production. The possible influence of other environmental

factors such as photoperiod or light intensity requires consideration, but there appears to be no published information on the effect of these factors on taro leaf production.

More cool tolerant Japanese cultivars, which have high corm growth rates through to early winter in New Zealand (Scheffer *et al*., 1999; Scheffer and Douglas, 2000), may produce more leaves from mid-winter to early spring than the tropical cultivars grown at the site to date. An extensive study of mid-winter to early spring leaf production in Japanese cultivars cannot be carried out until sufficient planting material is available.

Acknowledgements

Funding has been provided by the Community Employment Group, Department of Labour and the Ministry of Agriculture and Forestry Sustainable Farming Fund. I thank Professor Chris Triggs, Department of Statistics, University of Auckland for statistics and graphics work and Dr Peter Matthews, National Museum of Ethnology, Osaka, Japan for helpful comments.

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