

## MANDARIN PRODUCTION, CONTRIBUTION IN HOUSEHOLD INCOME AND LIVELIHOOD OF MANDARIN FARMERS IN THE EASTERN HILLS OF NEPAL: A CASE STUDY OF KHOKU VDC DHANKUTA DISTRICT

S. Gautam\*, S. Amatya\*, B. Sharma\*, M. B. Nepali\* and S.P. Srivastav\*\*

\*Socio-economics and Agricultural Research Policy Division, NARC

\*\*Citrus Research Program, Paripatle Dhankuta

### ABSTRACT

*Mandarin is one of the important cash generating fruit crop in the hills of Nepal. The productive area of mandarin in Nepal is 14601 hectare and annual production is 174868 these area and production are more than double of that of 10 years before. Khoku, One of the prominent mandarin growing villages of Dhankuta District, has been selected to conduct PRA survey in order to analyze mandarin production and contribution in household income and constraints. The study was initiated with the identification and selection of key sites under the command areas and group discussion was made with the concern farmers. In the PRA survey, almost 30 farmers participated. In the study area, 32 % of the total annual income is contributed by mandarin followed by 30 % non-farm activities (job salary, carpentry and remittance), 13 % cereal crops and 10 % livestock. Annual sell of mandarin in each household ranges from Rs 30000 to Rs 250000. Mandarin is sold on the contract basis. Most of farmers make the contract during the time of harvest. However, few farmers make the contract prior to harvesting time. Regarding the farm management practice, compost is used each year by all farmers. Sulphur is sprayed only by 5 % farmers and no chemical fertilizer is used. Farmers suspected the greening diseases in some trees of several farm. Sample has been collected and sent to NAST in order to make sure the diseases. However, farmers couldn't get the result so far.*

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**Key words:** productive area, production, prominent, household income, greening diseases,

### INTRODUCTION

Citrus is one of the most important cash generating fruit crop in the hills of Nepal. The productive area and production of citrus fruits in Nepal are 22903 hectare and 259191 Mt respectively. Among them productive area of mandarin is 14601, sweet orange 3972, lime 2653, lemon 1010 and others 685 hectare (MOAC, 2010). Area under cultivation of mandarin in the hills is increasing every year. There are significant opportunities to improve the productivity of mandarin. The mid hills of Nepal are quite suitable for citrus cultivation. However, the productivity of mandarin in Nepal is very low (12 Mt/ha) as compared to developed countries (50 Mt/ha) (Anon, 2001). There is no reliable channel of marketing for fruit sale in far western hills (Shrestha et al, 2007).

But in eastern hills of Nepal, we have to explore about the marketing channels and its function. "Citrus production and management systems in the western development region of Nepal" revealed that farmers sold the fruits to whole sellers and local consumer or vendors an average price of Rs 17 per kg. Products have no fruit grading system and there was high transportation cost. Fruits were sold by farmers individually. The citrus cultivation was very traditional, with tremendous scope to increase productivity through dissemination of scientific production technology. As a result, more than 90 percent of commercial demand of acid lime in Nepal has been supplied through import from India. Paudyal et al carried out survey and *in situ* germplasm evaluation in 2002/03 to study diversity and identify superior lime genotypes for off season production. This report revealed that production period of lime can be extended from four month to seven months (July-January) by utilizing location specific genotypes for Terai and mid-hill climate. Agricultural Perspective Plan (APP) has priorities horticulture as demand led sector to improve farmer's livelihood and the national economy (JMA/APROSC, 1995). The study tried to attain in fulfillment of the objectives. Major objectives were to analyse the growth rate of area, production and yield of mandarin in Nepal during last ten years period, examine the production, marketing and their constraints faced by the farmers and analyze the economic contribution of mandarin to farmer's livelihood enhancement.



## METHODOLOGY

The study was initiated with the identification and selection of major mandarin production sites under the command area using the Participatory Rural Appraisals (PRA) tools. The sites were selected with the concerned of extension personnel from District Agriculture Development Office of Dhankuta District. Khuku VDC of Dhankuta was selected to conduct the PRA survey. During the survey farmers including both genders provided the information. While selecting the farmers, all ethnic groups in that village were taken into consideration. Regarding the gender, both male and female were actively participated in the PRA survey. Primary and secondary data were included in the study. Checklist was prepared prior to the survey. Problems/issues, gender, farm activities, consumption, marketing, income and food security so that the impact of the mandarin research could be assessed.

## RESULTS AND DISCUSSION

### General socioeconomic characteristics of the site

Khoku is one of the prominent villages for mandarin production in terms of both quality and quantity. The village was situated 17 km west from Hile (one of the major mandarin collection center). The survey site had been connected with muddy road. Farmers used to carry their mandarin through the means of tractor since 2004 and altitude ranges 1000-12000 masl. Major ethnicity of the village is composed with Rai 90 %, followed by Dalit 6 % and Chhetri 4 %.

### Farmer's livelihood

Mandarin played vital role in term of cash generation. Household annual income was composed of 32% from mandarin, 30 % from non farm (job salary, carpentry and remittance), 13% from cereal crop, 12 % from livestock raising, 10 % from cash crops (ginger, amriso, potato) and 3 % from vegetables production (Table 1).

**Table 1.** Contribution in household income from various sources

Sources of income	Contribution %
Mandarin	32
Non farm(job salary, carpentry and remittance)	30
Cereal crops	13
Livestock	12
Cash crops( ginger, amriso, potato)	10
Vegetables	3

### Crop management practice

About 20 mandarin seedlings can be transplanted in one *ropani* of land and no any chemical fertilizer was used in the mandarin orchard. Farmers use compost during transplanted and add compost each year regularly. Only 5 % farmers sprayed Sulphur against powdery mildew in the month of May. Gestation period of mandarin is very long as compare to other fruits. Farmers reported that mandarin tree starts fruiting after 5 years of transplanting. However, full return from the mandarin is not possible unless 10- 15 years of plant age. A healthy tree can bear fruit even the age of 50 under good crop management practice.

### Size of mandarin farm in terms of sell value

Mandarin farmers were categorized into four sizes according to annual sell value. Majority (60 %) mandarin growers earned annual income from the mandarin, ranged between Rs 50000 – 100000 followed by 20 % ranged between Rs 100000 – 200000, 15 % ranged between Rs. 30000 -50000. However, the largest growers (5 %) earned annual income ranged between Rs 200000-250000.

**Table 2:** Size of mandarin farm in terms of sell value

Annual sell of mandarin (Rs)	Farmers %
200000-250000	5
100000-200000	20
50000-100000	60
30000-50000	15



### Major mandarin growing districts

In fiscal year 2009/10, total mandarin productive area in Nepal reached 14601 Ha and the production was 174868 Mt. Among 10 prominent mandarin growing districts, Syangja covers the highest productive area (892 Ha) followed by Lamjung 832, Tanahu 726, Kavrepalanchowk 614, Terhathum 566 and Gorkha 540 hectare. Dhankuta, the study districts came under ninth in terms of productive area. Regarding the yield, Tanahu has the highest yield (13.7 Mt/Ha) followed by Syangja, Lamjung, Gorkha, Dhading each district produces 13.2 Mt/Ha. Among top 10 districts, Arghakhanchi has the lowest yield 11.8 Mt/Ha. The national average yield of mandarin is almost 12 Mt/Ha

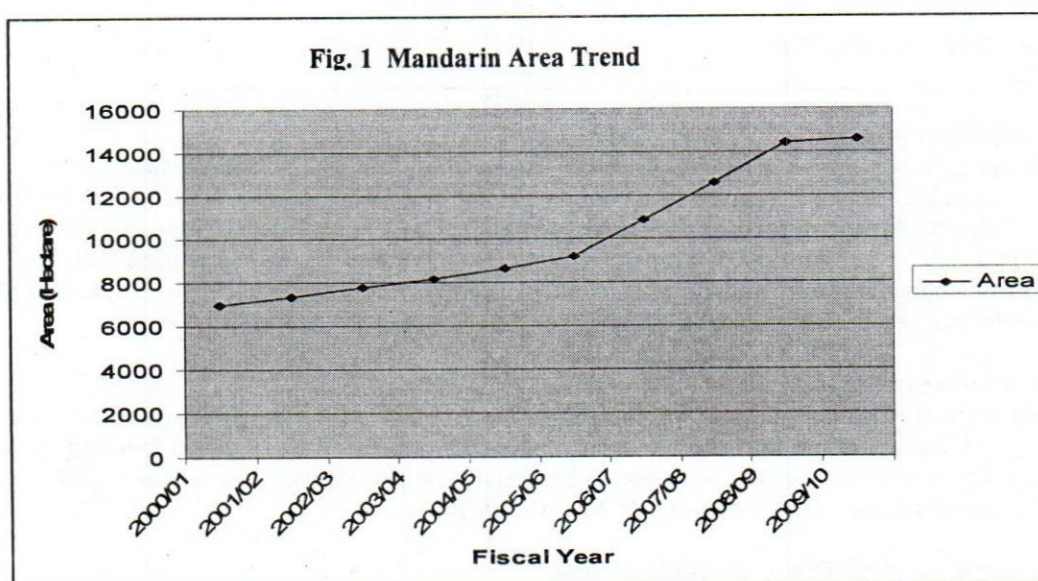
**Table 3:** Top 10 districts in terms of Productive area and production of mandarin in Nepal

S N	Districts	Mandarin productive area (Ha)	Production (Mt)	Yield Mt/Ha
1	Syangja	892	11775	13.2
2	Lamjung	830	10956	13.2
3	Tanahu	726	9950	13.7
4	Kavrepalanchowk	614	7669	12.5
5	Terhathum	566	7297	12.9
6	Gorkha	540	7130	13.2
7	Dhading	522	6387	12.2
8	Arghakhanchi	483	5694	11.8
9	Dhankuta	461	6034	13.1
10	Kaski	456	5421	11.9
	Other districts	8511	96555	11.3
	<b>Total</b>	<b>14601</b>	<b>174868</b>	<b>11.9</b>

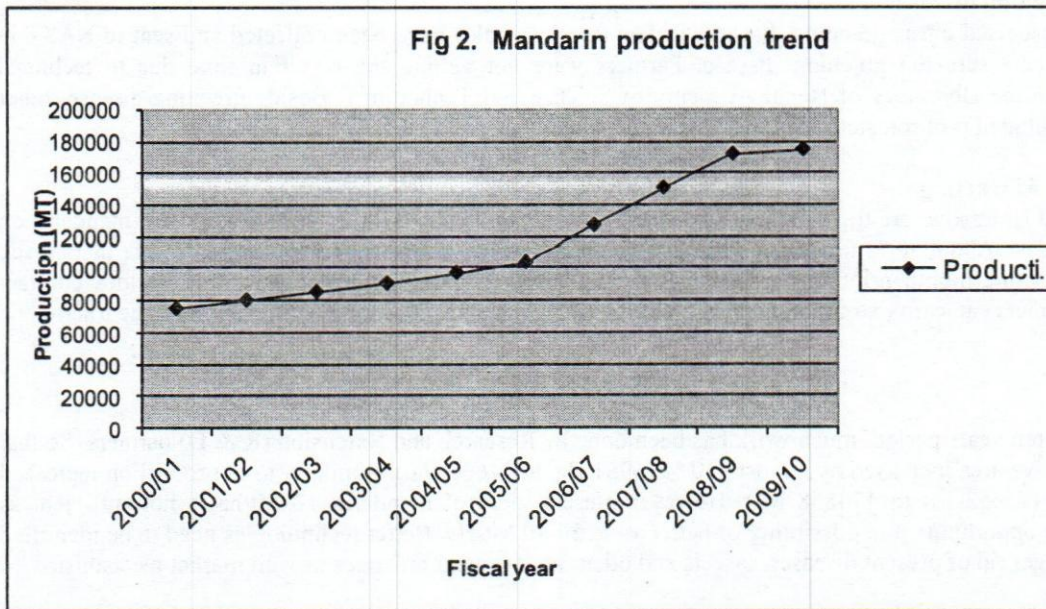
Source: MoAC, 2010

### Mandarin area and production growth rate during last ten years period

Total productive area of mandarin in Nepal was 6961 hectare and production was 75652 Mt until the fiscal year 2000/01. The growth rate for both area and production were slightly increased for the 5 years period. However, area growth rate and production growth rate sharply increased in three fiscal years 2006/07, 2007/08 and 2008/09. The growth rates were almost stagnant in the last fiscal year 2009/10 (Figure 1) and (Figure 2).

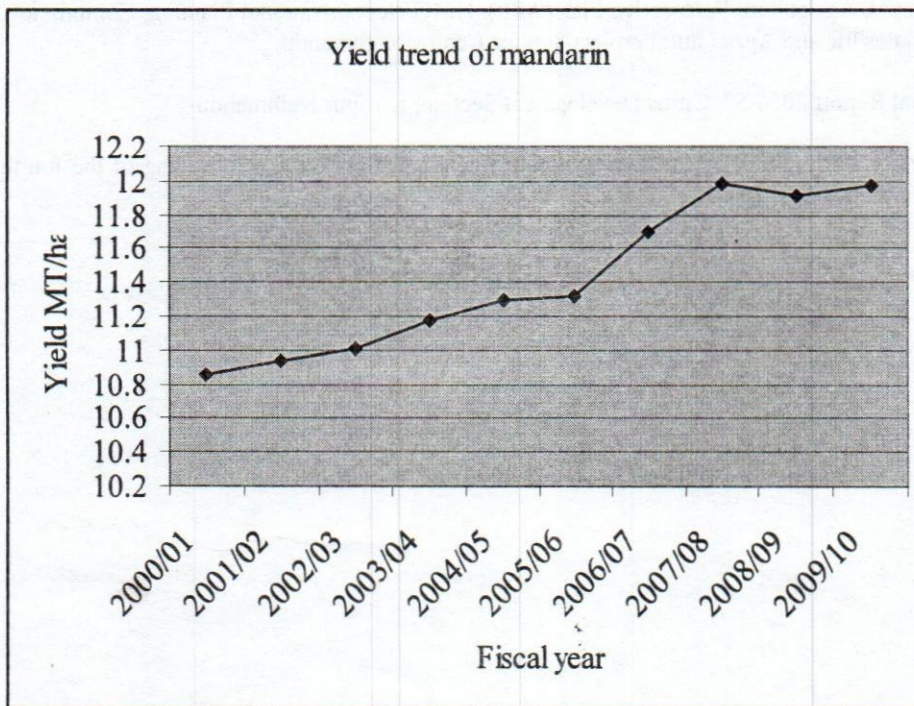






**Yield growth rate**

At the beginning of the fiscal year 2000/01, yield rate of mandarin was only 10.9 Mt/ha. The yield growth rate slightly increased until the fiscal year 2005/06. However, this growth rate was relatively higher during 2006/07 and 2007/08 (11.7 and 12 Mt/ha). This yield growth rate couldn't gear up after 2007/08. Instead the yield decreased in 2008/09. This is because area growth rate was higher than the production growth rate.





#### **Citrus greening disease**

Farmers suspected citrus greening diseases in few trees. Samples have been collected and sent to NAST in order to make sure the greening disease. Farmers were not getting the result in time due to technical problems in the laboratory of Nepal Academy of Science and Technology. Beside greening disease, other diseases included root rot, stem rot. These were the common diseases that farmers reported.

#### **Mandarin Marketing**

Dharan and Biratnagar are the main market centers for eastern Nepal. All the farmers sold their mandarin on contract basis. About 90 % farmers made the contract during harvesting time. However, 10 % farmers made the contract one month prior to harvesting time and received some money in advance. Besides contract money, farmers can earn extra money through harvesting, packaging and loading mandarin on the tractor.

### **CONCLUSION**

In the past ten years period, much work has been done by Research and Extension (R & D) partners. So that the productive area increased by almost 110 % (6961 Ha. to 14601 Ha.). Similarly total production increased by 131 % (75652 Mt to 174868 Mt). However present yield of mandarin 12 Mt/ha is not sufficient as compare to opportunity and possibility of better yield 30-40 Mt/ha. Better technologies need to be identified in order to get rid of present diseases, insects and other management practices as well market mechanism.

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