

Mother Tree Selection of Mandarin Orange (*Citrus reticulata* Blanco) for Varietal Establishment

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ABSTRACT

Mandarin orange is the second largest commercially grown fruit crop of Nepal. It is indigenous to Nepal, but none of its variety is recognized because of variations in external and internal characters prevailing in mandarin growing areas of Nepal. To produce uniform fruits acceptable to internal as well as external quality sensitive markets, this problem must be overcome. This study was carried out to select mother stocks from local cultivars and to establish 'true to the type' genome that can produce quality fruits of uniform characters. For this study, 10 and 11 pre-identified mandarin trees were selected in Dhusa (Dhading) and Khoku (Dhanakuta) respectively. Qualitative and quantitative characters of fruits like shape, base, rind color, size and weight of fruits, number of seeds and segments, pulp color, rind thickness, juice percent, total soluble solid : total acid ratio were examined. Among the 11 trees of Khoku (Dhanakuta) sample Krishna 1 stood on top with the largest fruit of 155.365g, juice content 32.67% and TSS:TA ratio 58:1. This was followed by Kewal 1 with fruit weight of 132g, juice content 40% and TSS:TA ratio 14.2:1. Khambjit 3b, Khambjit 1, Hikmat 4 and Khambjit 2 appeared almost similar with little variation in fruit weight, Juice percent and sweetness ratio. Therefore, above six trees and other two trees (Hikmat 2, Gajar 1) were recommended for at least one more investigation for final confirmation. Among 10 sample trees of Dhusa, Chiranjibi 2 was found superior quality with the largest fruit (232.5g), high juice content (50.86%) and TSS:TA ratio (19:1). Other seven samples namely Ran Bahadur 1, Kedar 1, Lila 1 & 2, Raghunath 1, Chiran 1 and Chiran 3 seemed almost similar (some with large fruit some with very juicy and some with high to very high sweetness ratio). Those samples were recommended for further investigation to confirm final selection of mother tree(s). The selected mother stocks (trees) would be recommended for varietal recognition and thereby to use as source plant for disease free true to the type sapling production.

Key words: high quality, mandarin orange, mother tree, selection, variation.

INTRODUCTION:

Although there is a controversy about the origin, citrus species is believed to be native to the tropical and subtropical parts of the Himalayan region, South East Asia and the Malayan Archipelago. Nepal is situated in the eastern Himalayan region. According to De Condole (1886), citrus originated some where in the eastern part of India, Siam or South China (Cochin China). Shan people, who migrated towards the south-west (Asam) from South-East China, might have brought it to India prior to the Christian era. According to Bonavia (1890), mandarins were found in semi-wild conditions in Butwal (Nepal), and Tanaka (1929) concluded that mandarin is indigenous to Nepal (NCDP, 1992). This indicated that mandarin is the oldest member of all commercial citrus fruits grown in Nepal, which is in general grown in the middle mountain region of the country from east to west.

Table 1: Area and production of Mandarin orange in Nepal (2007/08)

Particular	Area (ha)	Share (%)	Production (mt.)
All fruits	100099.0	100	630562
All citrus	30790	30.76	226404
Mandarin	20167	20.15	150737

(Source: FDD, 2010)

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It occupies 20167 ha, 65.5% of the total citrus area (30790 ha) and 20.15% of total fruit area (100099.0 ha) in the country (FDD, 2010; NCDP, 1990).

Increasing population, peoples' changing food habit, developing road links, expanding cities, increasing tourism and development of fruit processing industries and cold stores have created a big internal demand of fruits especially for mandarin orange. These factors have encouraged planners and farmers to extend more and more areas under this crop. At present very small fraction of the mandarin orange is reaching to the external/Indian market near borders. Nepalese mandarin orange has big internal and external markets, because the ripening season of Nepalese mandarin orange does not coincide with the harvesting season of the same in India. Government plan has always emphasized to increase production of this fruit for self sufficiency as well as for external markets. Along with the overall development of the country it has also obtained a very high commercial value. However, any produce cannot be accepted in the external or quality conscious markets unless it meets the quality standard of such markets. To produce high quality fruits, a plant must have such genetic character. Since centuries, mandarin orange is being grown by using seedling plants in Nepal. Therefore, variation in fruit characters and qualities is natural. Differences on fruit appearance (shape, size and color), rind surface and thickness of peels, internal quality of fruits such as total soluble solid (TSS), total



acidity (TA), juice percent and number of segments and seeds per fruit and time of fruit maturity are clearly seen in mandarin in every citrus growing area of Nepal

Fig.1: Mandarin fruits showing variation in shapes, bases and sizes.

Another big problem of citrus industry in the country is the greening disease, which spreads from one area to other mainly with the movement of saplings. Minimizing the problem is also important. Essentially major tasks to overcome the problems are selection and identification of mother stocks having desirable qualities in major mandarin growing districts and production and maintenance of pathogen free true to the type clone for clean source at suitable locations (altitude). Therefore, the study was carried out to achieve the first goal that is mother tree selection of mandarin orange for varietal establishment and standardization.

MATERIALS AND METHODS:

The study was carried out in Khoku VDC of Dhankuta district and Dhusa VDC of Dhading district during late eighties. A total of 21 trees with highly sweet fruits were selected and evaluated for the study. Eleven mandarin trees of seven orchards (farmers) in Khoku and ten trees of nine orchards (farmers) in Dhusa were selected based on local informants' and field-tests. All the trees were of seedling origin. According to the farmers, age of the trees ranged from 25–40 years. Equipments such as hand refractometer, acidometer, measuring

cylinder, beakers, glass rod, dropper, knife, juice extractor, tissue paper, camera, balance and scale were used in the assessment.

The main season of mandarin harvesting is suggested from last week of November to the last week of December. This may slightly vary with altitude of mandarin growing area (Renther et al., 1967; Tomiysau et al., 1998). When fruits are harvested earlier or later than the period, juice reduction and/or looseness in fruits are noticed (HDP, 1997; Tomiysau et al., 1998). In late Jan–Feb, fruits with loose and partially dried segment show regreening of fruits on the tree. These criteria for the study were determined following the citrus description given in Renther et al. (1967). As the fruits from sunny side have higher sweetness and better color, five fruits from each of the sample tree were picked up from the northern side of the trees. Observations taken for external and internal qualities were fruit appearance, (shape, base, apex, color and rind surface), fruit size, pulp texture and color, adherence of segments with peel, number of seeds and segment per fruit, thickness of rind, TSS, total acid and their ratio and juice percentage.

RESULT AND DISCUSSIONS

Fruit appearance (shape, apex and color) of mandarin orange is very important factors for market acceptance specially for the quality sensitive markets. No distinctive differences in fruit shape, rind color and pulp color were noticed among the samples. Rind color and pulp color in all cases were orange. Rind surfaces were also smooth in most samples except in few. Difference in other characters like fruit size and weight, rind thickness number of segments number of seeds, TSS and TA, juice percent were found among the samples as given in tables 2,3,4 and 5. Pulp of one sample in Khoku was found granulated and pulp of two samples in Dhusa were also found granulated.

Khoku mandarin orange

Qualitative fruit characters

No distinctive differences in fruit shape, rind color and pulp color were noticed among the samples. Rind color and pulp color in all cases were orange. Rind surface was also smooth in most of the samples. Apices of fruits varied from sample to sample. Fruit shapes in all samples were oblate (height less than diameter) but the appearances of the fruits differed from each other due to the base, neck size and types of shoulder. Fruit base, color, neck size are presented in Table 2.

Table 2: Qualitative (external) fruit characters of Khoku mandarin orange

Farmers' name (orchard)	Sample no.	Base	Apex
Hikmat Bahadur Karki	2	Rounded/flat, short necked	Depressed
Hikmat Bahadur Karki	4	Rounded/flat, short necked	Depressed
Krishna Bahadur Rai	1	Rounded/flat, short necked	Slightly depressed
Krishna Bahadur Rai	2	Necked	Depressed
Kewal Man Rai	1	Rounded, slight necked	Slightly depressed
Gajar Singh Rai	1	Obliquely necked	Slightly depressed
Khambjit Rai	1	Low collard short necked	Depressed with pitted surface
Khambjit Rai	2	Flat, slight necked	Depressed
Khambjit Rai	3B	Short necked	Depressed
Ram Lal Majhiya Rai	1	Moderately depressed	Slightly depress
Biman Bahadur Rai	1	Rounded short necked	Depressed with pitted surface

Quantitative Fruit Characters

Average fruit size varied from 5.5cm to 7.32cm, Likewise average fruit weight varied from 67.18g to 155.36g. Krishna1 fruit was the largest and the smallest one was Krishna 2.

Average fruit weight of six samples (Krishna 1, Rewal 1, Hikmat 4, Khambjit 3B, Biman 1 and Khambjit 2) were above 100g and that of Krishna 2 and Ram Lal 1 were below 80g. Rest two (khambjit 1 and Hikmat 2) weighed 97.82 and 96.75g respectively. Average rind thickness ranged from 2.2mm to 4.08mm. Average seed number per fruit varied from 7.5 to 16.3, however the actual number of seed ranged from 4 to 24 per fruit. Maximum seed was found in Krishna 1 (8-24) and the lowest one in Krishna 2 (4 to14). Variation in segment number was not much. It ranged from 8 to12. This seems to be normal in Nepalese mandarin orange (Tomyasu et al., 1998). Average TSS (Brix) ranged from 10.6 (Gagar 1) to 14.4 (Khambjit 1), while TA (Total acid) ranged from 0.2 (Krishna 1) to 0.95 (Biman 1). Fruits having comparatively low TSS (11.6 or 10.6) with very low TA (0.2 or 0.65) gave highest and higher ratio of 58 and 16.3 but fruits having very high TSS of 14.0 with high TA of 0.95 resulted in low ratio of 14.74 and tasted soury. Fruits having TSS and TA ratio below 15 were found soury and above that were sweet and very sweet (2,6). Krishna 1 was recorded with highest TSS:TA ratio of 58, followed by khambjit 1, Krishna 2 and Hikmat 2 having the sweetness ratio of 20.57, 18.57 and 17.60 respectively. Gagar 1, Hikmat 4 and Ram lal 1 were sweet enough having TSS:TA ratio 16.31, 15.29, 15.0 respectively. Highest juice content was found 40% in sample kewal 1 followed by 39.48, 39.47, 38.55, 37.23 in Khambjit 3B, Gagar1, Khambjit 2, Khambjit 1 respectively. Juice in other samples were found below 35 percent (Table 3). A survey of citrus fruit in four districts of Nepal also showed an average of 34.8 % juice in mandarin orange (2, 6).

Table 3: Quantitative fruit characters of Khoku mandarin orange

Farmers	Sample no.	Fruit size (cm)	Fruit wt. (g)	Rind thick (mm)	No. of seed	No. of segments	Juice%	TSS Brix	TA	TSS:TA
Hikmat	2	5.50	96.75	3.4	13	9-10	34.17	13.2	0.75	17.6 :1
	4	5.82	109.85	3.8	15.2	8-10	29.47	13.0	0.85	15.29
Krishna	1	7.32	155.36	3.4	8.5	8-11	32.67	11.6	0.20	58.0
	2	5.62	67.18	4.08	11.2	8-10	21.7	13.0	0.70	18.57
Kewal Man	1	6.66	132.0	2.2	12.8	9-10	40.0	11.4	0.80	14.20
Gagar Singh	1	6.27	92.7	2.62	12.5	8-11	39.47	10.6	0.65	16.31
Khambjit	1	6.2	97.82	2.9	10.6	8-12	37.23	14.4	0.7	20.57
	2	6.39	100.58	3.9	16.3	10-11	38.55	12.4	0.9	13.78
	3B	6.31	104.0	3.0	16.25	8-11	39.48	12.8	0.9	14.22
Ram Lal	1	5.76	75.8	3.0	8.6	8-10	28.76	12.0	0.8	15.0
Biman	1	6.4	101.2	2.8	7.5	9-11	32.23	14.0	0.95	14.74

Dhusa mandarin orange

Qualitative characters

Table 4: Qualitative (external) fruit characters of Dhusa mandarin orange

Farmers (orchards)	Sample no.	Base	Apex
Chiranjili silwal	1	Rounded to flat, slight neck	Depressed
Chiranjili silwal	2	Rounded low collared (short neck)	Depressed
Chiranjili silwal	3	Flat short necked	Depressed
Raghunath silwal	1	Low collared short neck	Depressed
Lila Nath silwal	1	Low collared necked & short necked	Depressed
Lila Nath silwal	2	Moderately depressed slight neck	Depressed
Babu Ram silwal	1	Flat to moderately depressed	Depressed
Hem Prasad silwal	1	Moderately depressed	Depressed
Ran Bahadur thapa magar	1	Depressed	Depressed
Kedar Nath silwal	1	Flat/Rounded slight neck visible	Depressed

Rind and pulp color in all cases were orange and fruit shapes in all samples were oblate (height less than diameter). But the appearances of fruits differed from sample to sample due to the types of base, neck size and types of shoulder. Variation in bases and necks (rounded/flat, low collared, moderately depressed, necked, short or slightly necked) and apices (depressed) were found as in table 4.

Quantitative fruit characters

Average fruit size ranged from 6.0cm to 8.4cm. Likewise average fruit weight ranged from 103.6 to 232g. Chirangibi 2 fruit was the largest weighing 232g followed by Ram Bahadur weighing 207.5g and the smallest one was Baburam1 103.6g. All samples showed average fruit weight above 100g (Table 5). Average rind thickness varied from 3.0cm to 4.37mm which is normal for a good mandarin (2,6). Average seed number per fruit varied from 9.4 to 19.6. The actual number of seeds varied from 5 to 25 per fruit. Maximum average seed per fruit recorded in Lila Nath1 was 19.6 and the lowest one was 9.4 in Ragu Nath 1. Variation in the number of segments recorded was from 8 to 14. Average TSS (Brix) ranged from 10.92 (Chirangibi 1) to 13.2 (Babu Ram 1) and that of TA (total acid) ranged from 0.46 (Ragu nath 1) to 1.5 (Lila 2). All the samples except one showed TSS and TA ratio above 15. Lila 2 sample with even higher TSS of 12.34 had very high TA of 1.5 resulting in very low ratio of 8.23 and tasted sour. Fruits having TSS and TA ratio above 15 were found sweet and very sweet (2,6). Raghunath 1 was recorded with highest TSS:TA ratio of 24.35 followed by 19.56, 19.5, 19.06, 18.21, 17.94, 17.77, 16.72 and 15.73 (Table 5). Highest juice content (56.58 %) was found in sample Lila 2 followed by 55.0, 54.6, 54.5, 54.25, 53.00, 50.86, 49.0, 48.93 and 46.0 of Baburam 1, Ragu Nath 1, Kedar 1, Hem 1, Ran Bahadur 1, Chirangibi 2, Chirangibi 3, Lila 1 and Chirangibi1 respectively (Table 5). A survey of citrus fruit in four districts of Nepal showed an average of 34.8 % juice content in mandarin orange (Tomyasu et al., 1998). Percentage of juice in Dhusa mandarin orange recorded higher than Khoku and average of other 4 districts (Dhankuta, Sinduli and Tanhu) (2, 6).

Table 5. Quantitative fruit characters of Dhusa mandarin orange

Farmers	Sample no.	Fruit size (cm)	Fruit wt. (g)	Rind thick mm	No. of seed	No. of segments	Juice %	TSS Brix	TA	TSS:TA
Chirangibi	1	7.4	146.75	3.57	13	8-10	46.0	10.925	0.6	18.21:1
	2	8.4	232.0	4.20	17.2	10-11	50.86	11.44	0.6	19.06:1
	3	7.0	137.5	3.25	14.5	9-10	49.0	11.7	0.6	19.5:1
Raghunath	1	6.95	136.6	3.80	9.4	9-10	54.6	11.25	0.46	24.35
Lila nath	1	7.42	177.8	3.81	19.6	10-12	48.93	12.56	0.7	17.94:1
	2	7.24	155.6	3.30	14.0	10-10	56.58	12.34	1.5	8.23
Babu Ram	1	6.0	103.6	3.17	12.0	10-10	55.0	13.32	0.68	19.56
Hem Prasad	2	6.24	110.6	3.0	13.0	8-10	54.25	12.72	0.87	15.73
Ran Bahadur	1	8.55	207.5	4.37	18.0	10-12	53.0	11.37	0.68	16.72

Selection of mother trees

As mentioned above, a lot of variations were seen both in qualitative and quantitative characters of fruits, specially base shoulder and neck size; and rind thickness, size, weight, TSS:TA ratio and juice percentage of fruits. Size of fruits varied even on the same tree and from tree to tree to some extent. The gradual change occurring in fruit color TSS, TA, juice content and other component is a natural phenomenon. Due to that, in the process of maturity (fruit ripening), rind color changes from green to yellow and orange, juice percent and TSS increases and TA declines. In Nepal, orange color of rind is taken as the sign of full maturity and high sweetness. Consumers prefer highly sweet taste with little

acid blend although Nepalese mandarin orange having orange color, round or flat base with short neck looks attractive and are liked by consumers but higher sweetness in juice gets the first priority. It was assumed that thick rind, higher number of seeds and segment cover (septa) are reflected in juice percentage of fruit. Therefore for selection, trees were compared mainly on the basis of fruit weight (size), high TSS:TA ratio and juice percent and they were ranked on the basis of score

Khoku

Fruit shape of all the samples v (155g) with highest TSS:TA rat (32:67). Its fruit shape was oblat were very sweet (TSS:TA=20.57) Fruits were oblate with rounded fruits with the highest juice per rounded base and slight neck. Si

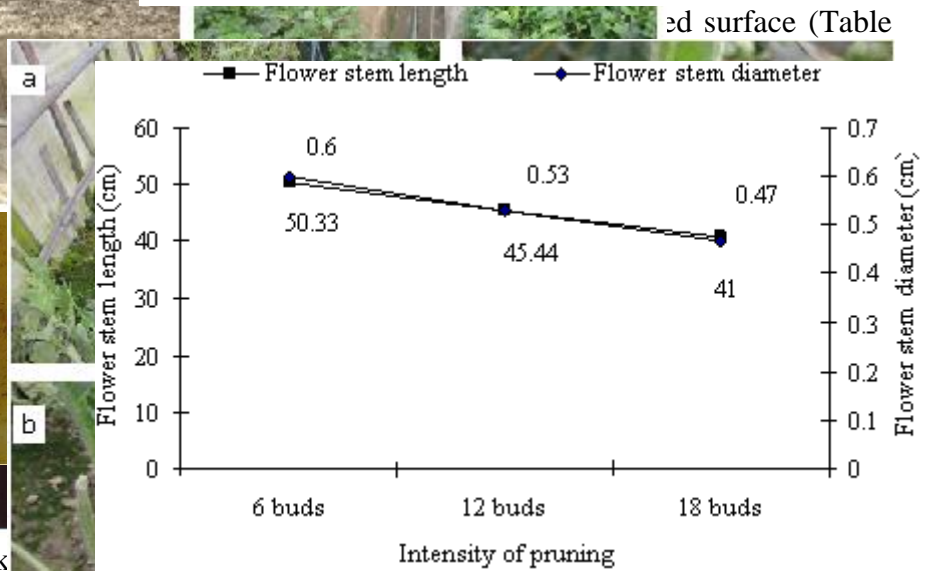
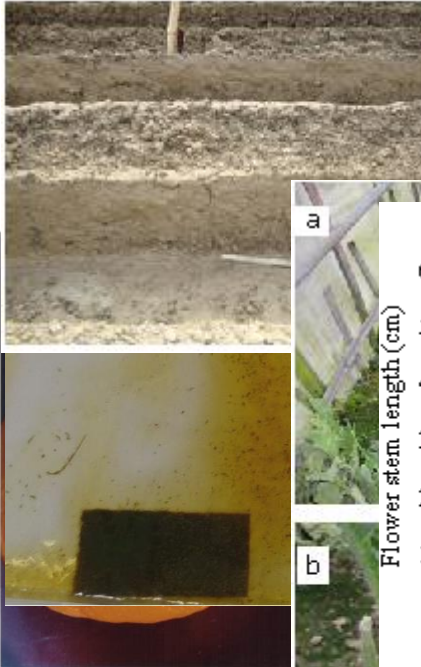
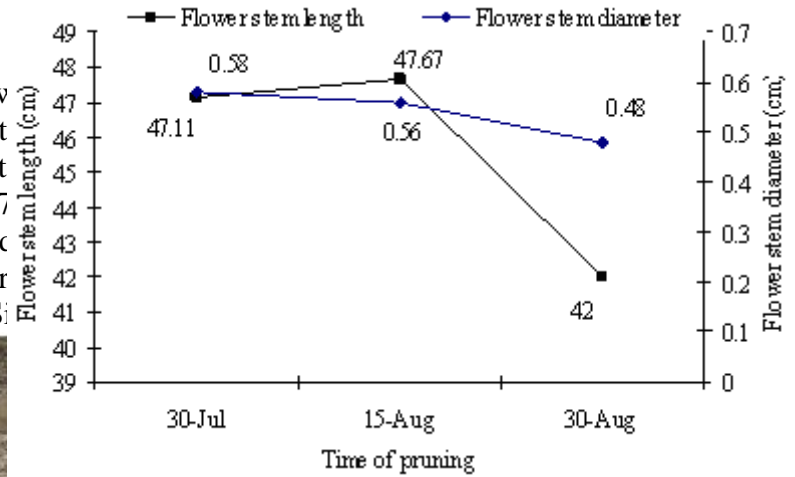


Fig.2: Krishna1 (Khoku)



Fig.3: Kewal Man 1 (Khoku), fruit showing rounded and slightly necked base.

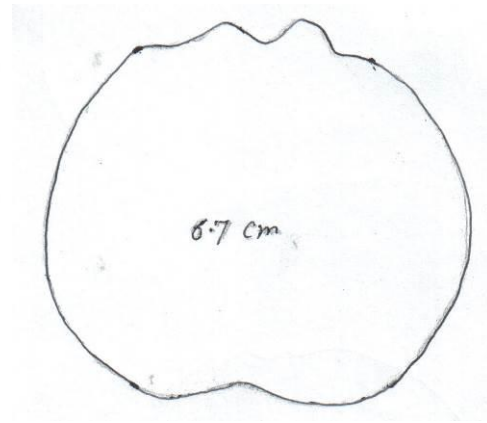
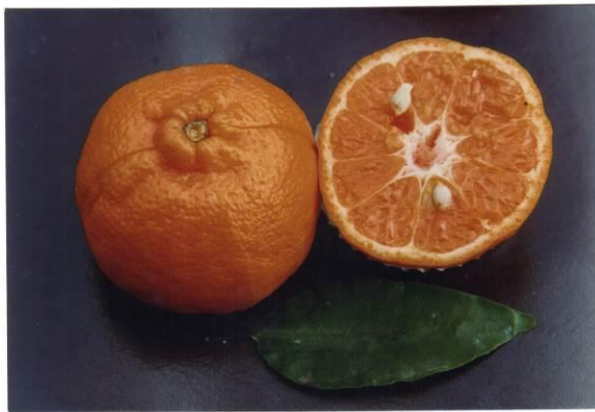


Fig.4: Khambjit 1 (Khoku), fruit with short necked low collared base, pitted surface showing fine vertical groove.

Table 5: Mother tree selection of mandarin orange, Khoku, Dhankuta

Farmers	Sample no.	Fruit base	Fruit wt (g)	Juice %	TSS Brix	TA	TSS:TA ratio	Total score
Krishna	1	Flat rounded	155.36	32.67	11.6	0.2	58.0	246.03
Kewatman	1	Rounded, low collared slight neck	132.0	40	11.4	0.8	14.2	186.0
Khambjit	3B	Depressed sl. Neck	104.0	39.48	12.8	0.9	14.72	157.7
Khambjit	1	Low collared, pitted surfaces, fine groove across	97.89	37.23	14.4	0.7	20.57	155.69
Hikmat	4	Flat round, short neck	109.85	29.47	13.0	0.85	15.29	154.61
Khambjit	2	Rounded slt neck	100.58	38.55	12.4	0.9	13.78	152.91
Hikmat	2	Flat round, short neck	96.75	34.17	13.2	0.75	17.6	148.52
Gajar singh	1	Rounded necked	92.7	39.47	10.6	0.65	16.31	148.48
Biman	1	Rounded pitted surface	101.2	32.23	14.0	0.95	14.14	147.17
Ram lal	1	Moderately depressed	75.8	28.76	12.0	0.8	15.0	119.56
Krishna	2	Necked	67.18	21.7	13.0	0.7	18.57	107.45
Average			103.03	33.97	11.64	0.746	19.84	

Dhusa

Fruit sizes of all the samples were above 100g. The average fruit size, juice content and TSS:TA ratio was 159g, 52.27 % and 17.89:1 respectively. Fruit Sample Chiranjibi 2 showed the largest size of fruit (232g), high juice percent (50.86) and higher level of sweetness; thus scored first among the 10 samples. This was followed by Ran Bahadur 1 with average fruit weight 207 g, very high juice content (53%) and sweet (TSS:TA ratio 16.72) in taste. Two samples namely Kedar 1 and Lila 1 found very similar having fruit weight 182g and 178g, Juice % (54.5 and 49) and TSS and TA ratio (17.77 and 17.94) respectively. Fruit base of Kedar 1 was low collared and that of Lila 1 was round is sort neck. Four samples Lila 2, Raghunath 1, Chiran1 and Chiranjibi 3 could be put under one category by score while other two samples Hem Prasad 1 and Baburam 1 grouped under same rank (Table 6).

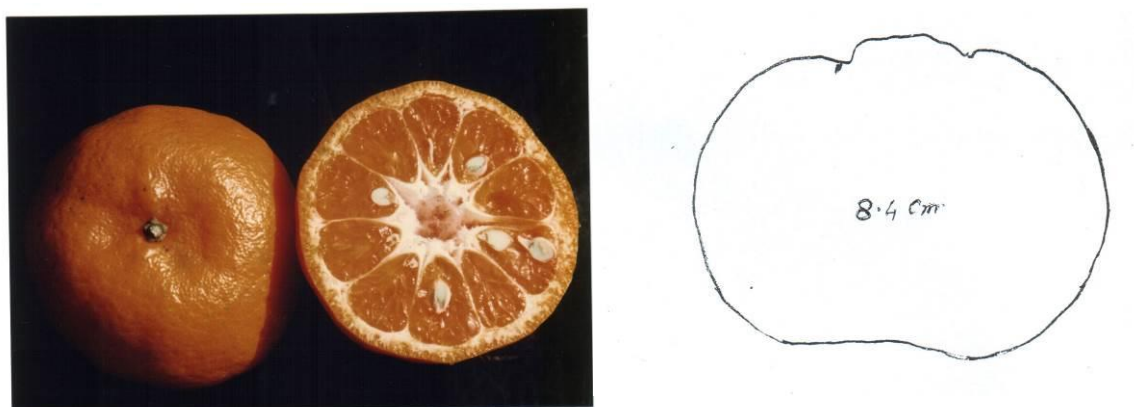


Fig..5 Chiranjibi 2 (Dhusa), fruit showing flate & low collared base with trace of neck.

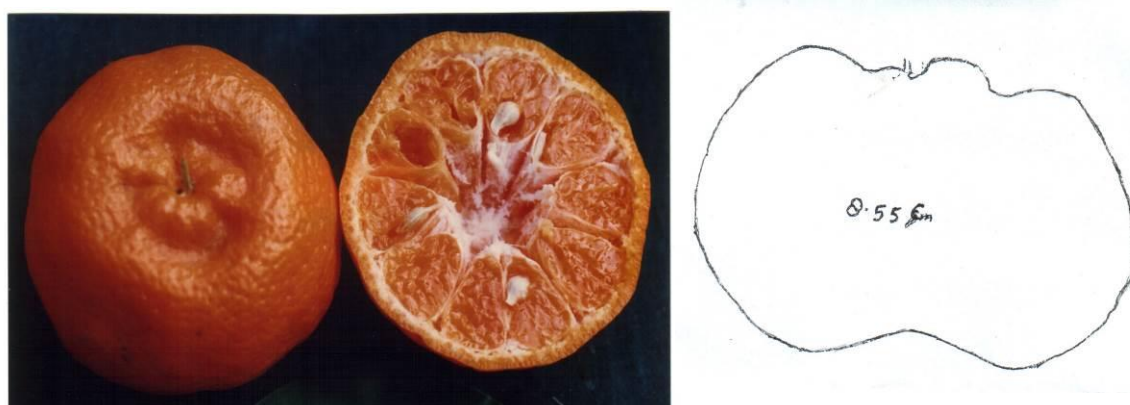


Fig.6: Ran Bhahadur 1 (Dhusa), fruit showing moderately depressed base with short neck

Table 6: Mother tree selection of mandarin orange, Dhusa (syadul), Dhading.

Farmers	Sample no.	Fruit base	Fruit wt (g)	Juice %	TSS Brix	TA Acid	TSS:TA ratio	Total score
Chiranjibi	2	Flat low collared slight neck	232.0	50.86	11.44	0.6	19.06	301.92
Run Bahadur	1	Moderately depress	207.5	53.0	11.37	0.68	16.72	277.22
Kedar	1	Flat low collared	189.0	54.5	12.62	0.71	17.77	261.27
Lila nath	1	Rounded low collared necked	177.8	48.93	12.56	0.7	17.94	244.67
Lila nath	2	Moderately depressed	155.6	56.58	12.34	1.5	8.23	220.41
Raghunath	1	Rounded low collared	136.6	54.6	11.25	0.46	24.45	215.55
Chiranjibi	1	Flat slight neck	146.75	46.0	10.92	0.6	18.2	210.96
Chiranjibi	3	Low collared short neck	137.5	49.0	11.7	0.6	19.5	206.0
Hem Prasad	1	Flat slightly depressed	110.6	54.25	12.72	0.87	14.62	180.58
Babu Ram	1	Moderately derpressed	103.6	55.0	13.32	0.68	19.59	178.19
Average			159.0	52.27	11.64	0.746	17.89	

CONCLUSIONS

Mandarin orange is said to be indigenous to Nepal. It is a very important and second largest commercial fruit crop being grown all over mid-hills of Nepal. However, a wide

variation in fruit characters or less uniform produce does not satisfy the choice of quality sensitive internal as well as export markets. This study was the first attempt to select mother stocks from local cultivars and to give recognition to the Nepalese mandarin orange with high qualitative characters. Fruit shape of all the samples was oblate (height less than diameter) while base of the fruit differed from sample to sample (Table 6,7). Form Khoku, sample Krishna 1 ranked the first position followed by Kewalman 1. Though Khambjit 3B showed higher in juiciness but sweetness near to the average. Fruit of Khambjit 1 was juicy and very sweet but little smaller while the fruit of Hikmat 4 was sweet and good size but little less juicy than average. Khambjit 2 had average fruit size and juicy but sour. From Dhusa (syadul), sample Chiranjibi 2 was on the top position with the largest fruit high juice % and very high TSS:TA ratio. Ran Bahadur1, Kedar1 and Lilanath1 seemed very similar with large fruit high juice content high level of sweetness (TSS:TA). Lilanath 2 had comparatively large fruit and very high juice % but sour. All the rest 5 samples had fruits over 100g, very high juice and sweet but Hem Prasad1 was little sour.

Top five trees of KHOKU (Dhanukta) and top four trees and other four trees (Raghnath 1, Chiranjibi 1, Chiranjibi 3 and Babu ram 1) Of Syadul (Dhading) are recommended for further investigation . Further investigations are needed to confirm this result because some variation may occur due to weather conditions and other factors. Such studies are also recommended to conduct for other major mandarin growing districts. These selected mother stocks (trees) will be used as source plants from where diseases free true to the type sapling will be multiplied for commercial fruit production of uniform and high quality mandarin orange.

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REFERENCES

- FDD, 2010. Annual Report 2009/10(2066BS). Fruit Development Directorate, Kirtipur, Kathmandu, Nepal.
- HDP, 1997. Annual Report, 1996/97. Horticulture Development Project, Kirtipur, Kathmandu, Nepal.
- NCDP, 1990. Report (1984/85-1989/90). National Citrus Development Program, Dhankuta, Nepal.
- NCDP, 1992. Annual Report. National Citrus Development Programme. Dhankuta, Nepal.
- Reuther, W., H. J. Webber and L. D. Batchelor (eds.), 1967. The Citrus Industry Vol I. Division of Agri. Sc., University of California, USA.
- Tomyasu, Y., S. K. Verma and D. B. Thapa, 1998. Citrus Cultivation in Nepal (Nepali). Kathmandu: Tobatha Books.