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EFFECT OF STANDARD OF PLUCKING ON QUALITY AND PROFITABILITY OF MADE TEA PRODUCED IN THE UP COUNTRY UVA REGION DURING THE NON FLAVOUR SEASON

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The yield, quality parameters, tasters' evaluation and profitability were compared for black tea manufactured from three different standards of plucking in the Uva region during off flavour season. The plucking standards used were bud and two leaves (B+2), bud and three leaves (B+3) and normal plucking (60% good leaf).

It was observed that yield obtained from normal plucking is significantly different when compared to B+2 and B+3 plucking standards. For the quality parameters significant difference were seen in TF and TC among different plucking standards and this was clearly reflected in tasters' evaluation where highest prices were obtained for B+3. Normal plucking standard fetched the lowest prices. Main grade BOP gave significantly higher values for B+3 and B+2 when compared to normal plucking. When the profitability of the three different plucking standards were compared, the highest net return was obtained for normal plucking and the net return for B+2 and B+3 are more or less similar.

These results showed that better quality teas can be obtained from B+2 and B+3 but when it comes to profitability normal plucking gave the highest value.

INTRODUCTION

Tea is a widely used beverage throughout the world second only to water. It is mostly sought after for its desirable liquor and flavour characteristics. The total extent of tea in Sri Lanka by 1995 was 187,309 ha., out of which about 46% was covered with VP tea (Ann.Rep.,1995).

Tea grows from almost sea level to about 2000m amsl. Elevationally the tea grown in Sri Lanka is categorized into three regions namely Low, Mid and High. Their tea distribution in the above three region is 42.5%, 30% and 27.5% respectively (Ann.Rep., 1995).

Black tea manufacture involves four major steps namely withering, rolling, fermentation and firing. Several chemical and biochemical changes take place during each of these stages and hence proper control of the manufacturing conditions is of importance in the production of a good quality tea.

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However, even if tea is manufactured under controlled conditions, a better quality tea cannot be obtained if the standard of plucking of tea is unsatisfactory. The objective of good standard of plucking is to obtain economic yields, to produce high quality tea and to maintain the tea bushes in good health (Odhiambo, 1988). Leaf from a coarse standard of plucking causes the accumulation of chemicals, which detract the quality and masks the attributes of the useful chemicals (Basu & Choudhury, 1984). The size range of harvested shoots depends upon the standard of plucking. The chemical composition of the leaf varies with the plucking standard (Mahanta et al., 1998). The quality potential of the mature leaves is lesser as against the immature leaves (Roberts, 1962).

The oxidized polyphenol fraction of made tea is made up of two different fractions namely Theaflavins (TF) and Thearubigins (TR). TF contribute to brightness and a part of colour whilst TR contribute to the thickness, body, strength, colour and astringency in tea (Ramaswamy, 1964). The present study was initiated during the off season. Hence attempts were made to produce a tea with desirable liquor characteristics including strength and body.

This study was undertaken to investigate the effect of three different standards of plucking on quality and profitability of black tea during the off season in the Uva region.

MATERIALS AND METHODS

Prior to initiating this study, a survey was done to find out the percentage distribution of seedling tea and clonal tea in Uva region. It was revealed that it is approximately 80% seedling tea and 20% VP tea. Out of the 20% VP tea the most popular clones are TRI 2025 and TRI 2024. It was selected from Craig estate, Bandarawella from demarcated plots which comprised 80% seedling, 14% TRI 2025 and 6% TRI 2024. The particular fields were in the 3rd year of the pruning cycle. Samples of tea flush consisting of bud and two leaves (B+2), bud and three leaves (B+3) and normal plucking (mixture of B+2, B+3 about 60% and other leaf about 40%) were plucked from two clones and seedling tea and transported in ventilated polypropylene bags. Thereafter leaf plucked from the three treatments were manufactured separately at St. Coombs factory, Talawakelle, at fortnightly intervals using experimental medium scale orthodox rollers (having capacities of 15 Kg withered leaf). The seedling and clonal fields were in close proximity. Seedling block contained thirteen plots for each treatment. TRI 2025, TRI 2024 blocks contained three plots and one plot for each treatment respectively. Every plot had the same number of plants (75 bushes). The design used was that of a Randomized Completed Block Design.

Methods: Following are the physical and chemical methods, which were used in this trial.

Yield - Yields of each standard of plucking during the trial period were obtained by the made tea manufactured from flush obtained from three different blocks in the same field which represented two clones and seedling tea. The crop was recorded weekly even though the manufacture was done fortnightly. The outturn was calculated by green leaf to made tea weight ratio from manufactured tea samples.

Grade percentage - Made tea samples from each treatment were graded into seven grades namely BOP, BOPF, Dust, BP, BM, Fannings and refuse tea. Each grade was weighed separately and the grade percentages were calculated. The off grade percentages were calculated by adding the percentages of BP, BM and Fannings.

Polyphenols - TF and TR were estimated using the method described by Roberts and Smith (1963).

Total Colour and Brightness - Quantitative estimation of total colour (TC) percentage and brightness (BR) percentage were done according to the method of Robert and Smith (1963).

Tasting - Organoleptic evaluations were made by two professional tea tasters in Colombo. Each taster was sent a set of 3 coded samples on each occasion of manufacture. The taster recorded his observations in a semi quantitative form on each sample. On the questionnaire each characteristic in turn was judged on a Headonic scale (Charley, 1978).

Profitability - Profitability was calculated by the following equation.

$$R = PiQi - Y\{(OxW)/I + M\}$$

R = Net Return (Rs/ha)
P = Price of individual Grades(Rs/kg)
Q = Quantity of individual Grades(Kg)
Y = Production (MT kg/ha)
O = Outturn (GL Kg/MT kg)
W = Wage rate (Rs/day)
I = Plucker Intake (GL kg/day)
M = Manufacturing Cost (Rs/kg)

MT = made tea GL = green leaf

The equation was formulated by the Agriculture Economics Unit, TRI in 1995.

When calculating the profitability, the following facts were considered as being constant, i.e. wage rate and the manufacturing cost. One kilogram of refuse tea was taken as Rs. 14/=.

RESULTS AND DISCUSSION

The effect of plucking standard on the yield is given in Table 1. The highest yield is observed for normal plucking and the lowest for B+3. The above results show statistically significant differences between B+2 and B+3. No significant difference was observed between B+2 and B+3.

Table 1 - *Yield for three different plucking standards*

Plucking standard	Yield (KgMT/round/1275 bushes)	Yield (KgMT/ha/yr)
B+2	3.95 (b)	1630.2
B+3	3.85 (b)	1588.9
Normal plucking	4.45 (a)	1873.7
LSD (p=0.05)	0.286	

Table 2 - Grade percentages of three different plucking standards

Plucking standard	BOP	BOPF	Dust	offGrade	Refuse Tea
Bud+2	38.96(a)	20.58	12.38	24.58(a)	3.5(a)
Bud+3	36.78(a)	21.10	11.02	27.20(ab)	4.9(a)
Normal	31.40(b)	21.08	11.75	28.61(b)	7.2(b)
LSD P=0.05	3.130	*NS	*NS	4.383	1.3016

Grade percentage values for three treatments are given in Table 2. Only BOP and the off grades showed a significant difference among treatments. The highest percentage of BOP was observed for B+2 and the lowest for normal plucking. Significant differences were found between B+2 and normal and also between B+3 and normal. With regard to off grades, there was a significant difference between B+2 and normal plucking. The highest value was observed for normal and lowest for B+2. Since there was no significant difference among treatments for BOPF and Dust, BOP and off grades percentages have greatly affected the profitability in each plucking standard. Probably as a result of more course leaf being presented in normal plucking, percentage of refuse tea was higher in normal plucking than B+2 or B+3 harvested. The important observation is that the percentage main grades were higher in B+2 compare with normal plucking or B+3. Conversely, the normal plucking had the highest off grade percentage.

Table 3 - Chemical constituents and the price of three different plucking standards

Plucking standard	TF%	TR%	TC	BR%	Price(Rs/kg)
Bud+2	1.315(a)	14.321	4.461(b)	27.383	82.07(ab)
Bud+3	1.330(a)	14.577	4.521(a)	27.451	84.50(b)
Normal	1.248(b)	14.248	4.255(b)	27.225	79.23(a)
LSD P=0.05	0.0763	*NS	0.1622	*NS	3.653

*NS - Not Significant

Table 3 shows the quality parameters in three different plucking standards. When considering the TF contents, there was a significant difference among the treatments at 5% levels and TF formation has enhanced when B+3 is harvested rather than when B+2 or normal plucking is adopted. When considering the TC there was a significant difference among the treatments. Here again it is observed that the B+3 has the highest value and the lowest value being for normal plucking. For percentage brightness and TR, even though there were no significant differences, B+3 has yielded the highest value whilst the normal plucking having the lowest. It is clearly reflected in the tasters' evaluations where B+3 got the highest price and the lowest price for normal plucking there is also a correlation between TF value and brightness. When the TF is more, brightness is more.

Table 4 - *Total Income, Total Cost, Net return of three different plucking standards*

Treatment	B+2	B+3	Normal
Yield(kg/ha/7months)	877.78	855.56	1008.89
NSA(Rs/kg)	82.07	84.50	79.23
Tea Sales Income (Rs/ha/7months)	72,039.40	72,294.82	79,934.35
Refuse Tea Income (Rs/ha/7months)	430.11	586.91	1011.31
Total Income (Rs/ha/7months)	72,469.51	72,881.73	80,945.66
Outturn(GL/MT)	4.60	4.95	5.90
Wage Rate(Rs/day)	83.00	83.00	83.00
Plucker Intake (kg GL/day)	11	11	21
Manufacturing Cost (Rs/kg)	13.50	13.50	13.50
Total Cost (Rs/ha/7months)	42,316.98	43,505.23	37,146.37
Net Return (Rs/ha/7months)	30,152.53	29,376.50	43,799:29

Extending this study one step further the profitability per unit area of three different plucking standards were obtained for the off season period. In this study, plucking cost is the most important factor. Each treatment plucking cost is different. According to the equation Plucker intake and the outturn are the variable components, which determine the plucking cost. In this study plucker intake for normal plucking is considered as 21 and assumed 11 for both B+2 and B+3. According to Table 4 normal plucking gave the highest net return. Net returns for B+2 and B+3 are more or less similar. Although fine plucking gave better quality teas that gain in quality could not compensate for loss of yield for B+2 and B+3 plucking during off season.

CONCLUSIONS

On the basis of the findings of the above trial it is apparent that samples collected from tea manufactured using B+3 leaves have scored the highest value in relation to several parameters. This was further substantiated by the highest price the respective teas fetched according to the evaluations made by several tea brokering firms. It should however be noted that the above standard of plucking is only applicable to teas manufactured during the non flavour season. When it comes to profitability, however, even though fine plucking gave better quality teas, that gain in quality could not compensate the loss of yield in particular during off season and tea manufactured from normal plucking gave the highest profitability. As far as yield is concerned normal plucking gave the highest yield and B+2 and B+3 yields are more or less similar.

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