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Evaluation of Nutrient Status and Development of Fertilizer Requirements For Khasi Mandarin (*Citrus Reticulata Blanco*) Grown In Tamenglong District of Manipur

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Abstract – Extensive surveys were carried out covering as many as 40 orchards of Khasi mandarin in Thangal village of the sub-division Nungba under Tamenglong district in the year 2010-2011. Nutrient constraints in the form of N, P, Ca, Mg, Cu, and Zn were identified using these diagnostics which must find a due place in a fertilizer program of mandarin orchards of the region to obtain sustainable optimum fruit yield. The values of available nutrients viz., N, P, and K across 40 orchards varied from 92.2 to 348.2 mg/kg, 5.0 to 9.4 mg/kg, 110.0 to 440.1 mg/kg, respectively, with corresponding coefficient of variation (%) of 11.8, 9.2, and 16.4 respectively. Soil micronutrients showed a large variation of 11.2- 48.1 mg/kg Fe (CV 16.2%), 11.4-44.0 mg/kg Mn (CV 11.2%), 0.80-2.5 mg/kg Cu (CV 6.9%) and 0.50-2.8 mg/kg Zn (CV 7.4%). Leaf nutrient concentration like soil fertility showed a wide variation from 1.62-2.62 % N, 0.04-0.12% P, 0.72-1.89% K, 0.90-2.24% Ca and 0.28-0.61% Mg. Similarly, the micronutrients, namely Fe, Mn, Cu, and Zn expressed in ppm, varied from 118.4-282.3, 32.3-92.4, 1.0-3.8 and 14.6-28.4. It was observed that maximum nutrients are removed (in mg/tree) in the proportion of 171.90 N, 17.19 P, 34.38 K, 68.76 Ca, 17.19 Mg, 0.34 Zn and 0.20 Cu in relation to an average mean fruit yield of 34.38 (kg/tree) by Khasi mandarin i.e. orchard no. 1. Minimum nutrients are removed (in mg/tree) in the proportion of : 113.75 N, 11.37 P, 22.75 K, 45.50 Ca, 11.37 Mg, 0.22 Zn and 0.13 Cu in relation to an average mean fruit yield of 22.75 (kg/tree) by Khasi mandarin i.e. orchard no. 9. These observations give an insight about the order in which, different nutrients are preferred by specific citrus cultivar, and the ratio in which different nutrients are removed. Such nutrient removal patterns are to be meted out in order to maintain the sustained supply of the nutrients through soil.

Keywords *– Khasi mandarin, macro-micro nutrients, fertilizers, Tamenglong*

I INTRODUCTION

Globally, citrus is one of the important fruit crops being cultivated in an area of 3.35 million ha with a total production of 91 million tons. The current average productivity of citrus orchards in India is 8.9 tons ha^{-1} compared to 4.52 tons ha^{-1} obtained in northeast India (Srivastava and Singh 2002 a), the region historically believed to have witnessed the dissemination of citrus to other parts of the world. Cultivation of Khasi mandarin (*Citrus reticulata* Blanco) in northeast India is mainly confined to mid-hills upto an elevation of 1200 m above mean sea level under humid tropical climate.

The highest quantum of production harvested globally is represented by soil orders viz., Alfisol, Oxisol, Ultisol, Entisol, and Inceptisol (Srivastava and Singh, 2002b). The establishment of citrus orchards on steep slopes without contour trench planting or terracing has accelerated the menace of the problem by exposing the comparatively more acidic and infertile sub-surface having poor nutrient reserve to support the required nutrition of plants (Srivastava and Singh 2002 a). Of the different diagnostic tools leaf and soil- based nutrient standards have established their superiority over rest of the diagnostic methods. In the background of this information, the studies were carried out with the objectives viz. To determine the nutrient status and developing the fertilizer requirement.

II MATERIALS AND METHODS

Extensive surveys were carried out covering as many as 40 orchards of Khasi mandarin in Thangal village of the sub-division Nungba under Tamenglong district in\ the year 2010-2011. Tamenglong district's topography is made up of mostly of rugged hills, lofty mountains and rolling valleys with occasional human habitation in the bucolic hamlets. The district encompasses an area of 4391 sq. km. and stretches across the latitudinal parallel to 24^0 59' north and the longitudinal meridian of 93^0 30' east.

The present study was carried out in one experimental locations i.e. Thangal village under Nungba sub-division. The geographical co-ordinates of Nungba is latitude 24^0 45'0" North, longitude $93^0$26'0" East. The mean summer and mean winter temperature of this region vary from 31°C and 4°C and annual rainfall of3135 mm with relative humidity 76% (minimum), 92% (maximum).

Soil and leaf sampling:

Soil samples were collected from skirt belt/perimeter of trees, the zone having maximum concentration of feeder roots at soil depth of 0-20 cm. Likewise; the leaf positions from non-fruiting terminals covering 2-10% trees at a height of 1.5-1.8 m from the ground were sampled.

Analytical methods:

Collected soil samples were air dried, ground, and passes through 2mm sieve, and subjected to analysis of available nitrogen using Alkaline Permanganate Method (Subbiah and Asija, 1956), Bray-P using ammonium fluoride extraction by shaking 1g soil in 20 ml of 0.03 (N) NH4F in 0.025 N HCl for 30 min., Ca, Mg, and K extractable in 1 N neutral NH4OAc in 1:2 soil : extractant ratio after shaking for 30 min. (Lanyon and Heald, 1982) and micronutrients (Zn, Cu, Mn and Fe) in 0.05 M (pH 7.3) DTPA- CaCl2 after shaking 20g soil and 50 ml extracatant together for 2 hours (Linsay and Norvell, 1978).

Leaf samples were thoroughly washed (Chapman 1964) and ground using a Wiley-Grinding machine to obtain homogenous samples. Tri-acid (HClO4: HNO3: H2SO4 in 2:5:1) extracts of leaf samples (Chapman and Pratt 1961) were subjected to analysis of P using vanadomolybdophosphoric acid (ammonium molybdate + ammonium metavanadate) method, K flame photometrically, Calcium and magnesium by versene titration (Lanyon and Heald 1982) using ammonium purpurate (murexide) and erichrome black-T as indicators for Ca and Ca+ Mg, respectively, and micronutrients by Atomic Absorption Spectrophotometer. While, total N in leaves was determined using auto-nitrogen analyzer.

III RESULTS AND DISCUSSION

Available macro and micro nutrients in the soil

Optimization of soil properties is an emerging field of investigation. It represents a new stage in managing soil fertility in which the transition is made from simple improvement of soil properties to regulation of these properties aimed to bring them into agreement with plant needs in order to achieve maximum yields (Srivastava and Singh 2001a, 2001b). The values of available nutrients viz., N, P, and K across 40 orchards varied from 92.2 to 348.2 mg/kg, 5.0 to 9.4 mg/kg, 110.0 to 440.1 mg/kg, respectively, with corresponding coefficient of variation (%) of 11.8, 9.2, and 16.4 respectively. The mean values of N, P, K, Ca and Mg were observed as 180.5, 7.0, 196.1, 156.8 and 36.5 mg kg-1 respectively (Table 1). This results are similar to those in the book entitled “Citrus in NEH Region” authored by Singh et al. (2006).The mean values of Fe, Mn, Cu, and Zn were observed as 28.7, 21.2, 1.4 and 0.8 mg kg-1. Micronutrients likewise showed a large variation of 11.2- 48.1 mg/kg Fe (CV 16.2%), 11.4-44.0 mg/kg Mn (CV 11.2%), 0.80-2.5 mg/kg Cu (CV 6.9%) and 0.50-2.8 mg/kg Zn (CV 7.4%) (Table 2). This results are similar to those in the book entitled “Citrus in NEH Region” authored by Singh et al. (2006).

Leaf macro and micro nutrients composition

Validity of the leaf analysis as an instrument for controlling the mineral nutrition is related to the significance, the total concentration in the leaf gives a precise image of the production output of crop and its dependence on the supply of each nutrient. Leaf nutrient concentration like soil fertility showed a wide variation from 1.62-2.62 % N, 0.04-0.12% P, 0.72-1.89% K, 0.90-2.24% Ca and 0.28-0.61% Mg. The mean values of N, P, K, Ca, Mg were observed as 2.1%, 0.09%, 1.4%, 1.76% and 0.62% respectively with corresponding co-efficient of variation (%) of 15.45, 29.02, 28.47, 21.14 and 36.35 respectively (Table 3). Earlier studies (Srivastava and Singh 2001c,2003a) using Nagpur mandarin (Citrus reticulata Blanco) as test crop grown on Ca rich alkaline montmorillonitic black clay soils under hot sub-humid tropical climate of central India showed similar kind of delineation of nutrient levels having statistically significant difference in relation to fruit level. Under similar growing conditions, Ko and Kim (1987) suggested optimum leaf N, P, K, Ca, Mg as 2.5-2.8, 0.19-0.20, 1.5-1.7, 2.5-3.0, and 0.30-0.35 % respectively, for Satsuma mandarin grown in Jeju Island of Korea. While other studies in Japan using Clementine mandarin as test crop, Terblance and Du Plessis (1992) observed optimum values of different nutrients as: 2.5-2.7% N, 0.10-0.15% P, 0.80-0.90% K, 4.0-5.0% Ca, and 0.25-0.30% Mg. the variation in optimum values are dominantly governed by specific diagnostic norms for precise identification of nutrient constraints comensurating with field conditions.

Similarly, the micronutrients, namely Fe, Mn, Cu, and Zn expressed in ppm, varied from 118.4-282.3, 32.3-92.4, 1.0-3.8 and 14.6-28.4. The concentration of different nutrients in leaf showed a significant difference when separated at various levels, except Mg, Fe and Mn. The mean values of Fe, Mn, Cu, and Zn were observed as 201.3, 61.9, 2.3 and 22.0 with corresponding coefficient variation (%) of 18.2, 25.52, 33.16 and 19.72 respectively (Table 4). This results are similar to those in the book entitled “Citrus in NEH Region” authored by Singh *et al.* (2006).

Fruit nutrient removal

A significant amount of nutrients is removed by the citrus fruits. It was observed that maximum nutrients are removed (in mg/tree) in the proportion of : 171.90 N, 17.19 P, 34.38 K, 68.76 Ca, 17.19 Mg, 0.34 Zn and 0.20 Cu (Table 3) in relation to an average mean fruit yield of 34.38 (kg/tree) by Khasi mandarin i.e. orchard no. 1. Minimum nutrients are removed (in mg/tree) in the proportion of : 113.75 N, 11.37 P, 22.75 K, 45.50 Ca, 11.37 Mg, 0.22 Zn and 0.13 Cu (Table 5) in relation to an average mean fruit yield of 22.75 (kg/tree) by Khasi mandarin i.e. orchard no. 9. These results are

accordance with the findings of Srivastava and Singh (2004a).

These observations given insight about the order in which, different nutrients removed by the citrus crop is required to replenish in the soil to sustain the productivity which are preferred by specific citrus cultivars in the ratio in which different nutrients are removed. Such nutrient removal patterns are to be meted out in order to maintain the sustained supply of the nutrients through soil which will lead to sustain the productivity to the citrus cultivar of Manipur.

Table 1. Available supply of nutrients in soil relation to fruit yield in Khasi mandarin orchards of Manipur

Orchard No.	Macronutrients (mg/kg)					Fruit yield	
	N	P	K	Ca	Mg	No./tree	kg/tree
Orchard No.1							
1a	348.2	9.4	440.1	313.4	64.2	310	46.8
1b	280.4	8.1	330.2	280.2	63.1	210	38.4
1c	240.2	8.0	280.4	210.3	52.0	180	32.0
1d	238.1	7.4	282.4	204.0	40.0	140	20.3
Orchard No.2							
2a	240.8	7.1	210.3	192.3	42.4	140	18.4
2b	260.1	8.2	300.4	204.6	52.4	240	28.2
2c	210.4	6.3	182.3	111.0	31.0	220	22.0
2d	218.6	6.2	186.0	128.6	31.3	200	24.6
Orchard No.3							
3a	262.0	8.8	310.4	210.4	52.3	195	40.4
3b	210.4	7.2	210.0	180.3	44.8	170	32.2
3c	228.3	8.2	282.3	210.4	33.2	220	36.2
3d	212.4	6.4	189.0	180.3	32.1	195	28.2
Orchard No.4							
4a	162.1	6.4	160.0	150.0	28.2	110	20.6
4b	156.2	7.0	168.0	152.3	32.2	150	22.7
4c	128.3	5.2	122.3	100.0	19.4	100	18.4
4d	210.4	7.2	210.4	160.4	40.2	160	30.0
Orchard No.5							
5a	172.0	7.0	131.0	104.0	42.0	100	19.4
5b	210.1	8.4	180.4	140.3	38.2	200	36.4
5c	180.0	7.6	140.2	110.8	22.1	110	21.0
5d	192.2	8.0	170.6	130.2	61.1	190	32.3
Orchard No. 6							
6a	194.0	8.0	190.4	162.2	44.1	150	30.4
6b	183.1	7.2	192.0	160.3	50.2	135	28.3
6c	110.0	6.4	180.3	140.0	40.3	80	18.2

6d	204.3	8.2	280.4	240.3	58.2	190	42.3
Orchard No. 7							
7a	122.0	5.0	186.0	166.1	21.3	140	20.3
7b	120.2	6.2	182.0	102.0	22.0	100	19.4
7c	182.2	8.4	234.2	210.3	42.0	180	40.3
7d	162.0	5.2	180.2	180.2	30.8	140	32.2
Orchard No. 8							
8a	100.0	5.2	140.3	110.2	22.0	100	18.2
8b	114.6	7.4	152.0	162.1	23.0	166	32.6
8c	110.3	7.2	182.0	160.4	32.8	158	30.4
8d	92.2	6.1	172.0	98.2	28.1	118	19.6
Orchard No. 9							
9a	86.4	6.2	110.6	172.0	24.2	145	21.3
9b	210.2	8.1	161.9	182.3	32.2	200	40.4
9c	110.2	5.8	110.0	90.3	27.1	90	12.4
9d	180.4	6.0	118.1	106.7	30.2	145	16.9
Orchard No. 10							
10a	152.2	5.2	132.7	111.8	22.4	148	22.9
10b	142.2	6.1	158.6	122.0	24.3	158	26.4
10c	161.2	7.8	182.0	132.8	41.3	200	32.3
10d	110.0	5.8	112.0	80.3	22.0	84	11.6
Mean	180.5	7.0	196.1	156.8	36.5	159.2	27.1
CV (%)	11.8	9.2	16.4	8.9	7.2	16.4	13.8

Total number of units/observations = 40

Table 2. Available supply of nutrients in soil in relation to fruit yield in Khasi mandarin orchards of Manipur

Orchard No.	**Micronutrients (mg/kg)**				**Fruit yield**	
	Fe	**Mn**	**Cu**	**Zn**	**No./tree**	**kg/tree**
Orchard No.1						
1a	32.2	42.0	2.5	2.8	310	46.8
1b	30.2	44.0	2.2	1.4	210	38.4
1c	34.2	38.2	1.7	1.4	180	32.0
1d	41.4	32.0	1.2	0.80	140	20.3
Orchard No. 2						
2a	34.6	24.2	1.8	0.74	140	18.4

2b	38.2	23.2	2.1	0.82	240	28.2
2c	31.3	24.1	1.2	0.60	220	22.0
2d	41.4	22.0	1.0	0.62	200	24.6
Orchard No. 3						
3a	44.2	18.4	1.8	0.90	195	40.4
3b	41.2	22.2	1.2	0.80	170	32.2
3c	38.2	21.2	1.4	0.82	220	36.2
3d	40.2	23.2	1.2	0.65	195	28.2
Orchard No. 4						
4a	19.4	14.6	1.0	0.64	110	20.6
4b	24.2	16.2	1.1	0.60	150	22.7
4c	24.2	18.1	1.2	0.56	100	18.4
4d	32.1	20.1	1.4	0.70	160	30.0
Orchard No. 5						
5a	42.1	32.1	1.2	0.52	100	19.4
5b	48.1	28.2	1.4	0.86	200	36.4
5c	37.2	22.4	1.6	0.52	110	21.0
5d	24.3	22.0	1.0	0.76	190	32.3
Orchard No. 6						
6a	34.2	21.0	2.0	0.55	150	30.4
6b	32.1	18.9	1.8	0.50	135	28.3
6c	22.8	24.0	1.4	0.60	80	18.2
Orchard No. 7						
7a	34.2	18.4	1.1	0.80	140	20.3
7b	28.1	20.0	1.0	1.0	100	19.4
7c	22.0	22.0	1.4	1.5	180	40.3
7d	21.0	20.0	1.1	1.2	140	32.2
Orchard No. 8						
8a	21.0	18.1	0.80	0.82	100	18.2
8b	18.2	18.4	1.7	0.96	166	32.6
8c	11.2	17.1	1.8	0.90	158	30.4
8d	17.4	14.2	1.2	0.61	118	19.6
Orchard No. 9						
9a	18.2	18.2	1.0	0.80	145	21.3
9b	19.2	11.6	1.6	0.86	200	40.4
9c	20.1	11.3	0.80	0.60	90	12.4
9d	22.2	14.2	1.10	0.66	145	16.9

Orchard No. 10						
10a	21.2	13.2	1.4	0.60	148	22.9
10b	19.6	12.2	1.7	0.66	158	26.4
10c	20.2	12.1	1.9	0.78	200	32.3
10d	22.3	11.4	0.90	0.54	84	11.6
Mean	28.7	21.2	1.4	0.8	159.2	27.1
CV (%)	16.2	11.2	6.9	7.4	16.4	13.8

Total number of units/observations = 40

Table 3. Leaf nutrient composition in relation to fruit yield in Khasi mandarin orchards in Manipur

Orchard No.	**Macronutrients (%)**					**Fruit yield**	
	N	**P**	**K**	**Ca**	**Mg**	**No./tree**	**(kg/tree)**
Orchard No.1							
1a	2.62	0.12	1.89	2.10	0.56	310	46.8
1b	2.44	0.10	1.62	1.92	0.42	210	38.4
1c	1.70	0.07	1.40	1.61	0.30	180	32.0
1d	1.62	0.05	1.10	1.42	0.20	140	20.3
Orchard No. 2							
2a	2.01	0.06	1.10	1.80	0.32	140	18.4
2b	2.32	0.09	1.30	1.90	0.46	240	28.2
2c	2.30	0.08	0.90	1.82	0.38	220	22.0
2d	2.20	0.07	0.94	1.89	0.40	200	24.6
Orchard No. 3							
3a	2.42	0.12	1.94	2.04	0.61	195	40.4
3b	2.30	0.10	1.82	2.01	0.52	170	32.2
3c	2.34	0.11	1.92	2.12	0.56	220	36.2
3d	2.20	0.07	1.72	2.01	0.48	195	28.2
Orchard No. 4							
4a	1.72	0.07	1.32	1.60	0.29	110	20.6
4b	1.82	0.06	1.42	1.70	0.42	150	22.7
4c	1.62	0.06	1.12	1.82	0.32	100	18.4
4d	2.12	0.11	1.82	1.92	0.40	160	30.0
Orchard No.5							

5a	1.10	0.05	0.92	0.90	0.32	100	19.4
5b	2.20	0.10	1.94	1.72	0.56	200	36.4
5c	1.80	0.08	1.82	1.42	0.40	110	21.0
5d	1.70	0.06	1.74	0.98	0.40	190	32.3
Orchard No. 6							
6a	2.30	0.10	1.56	1.93	0.54	150	30.4
6b	2.10	0.09	1.42	1.91	0.48	135	28.3
6c	1.70	0.07	0.92	1.64	0.40	80	18.2
6d	2.42	0.12	1.62	2.12	0.61	190	42.3
Orchard No. 7							
7a	1.98	0.08	0.98	1.28	0.28	140	20.3
7b	2.12	0.07	1.12	1.72	0.32	100	19.4
7c	2.42	0.13	1.72	2.12	0.61	180	40.3
7d	2.32	0.11	1.78	2.10	0.52	140	32.2
Orchard No.8							
8a	1.70	0.06	1.01	1.84	0.30	100	18.2
8b	2.20	0.12	1.82	2.12	0.61	166	32.6
8c	2.30	0.13	1.58	2.24	0.52	158	30.4
8d	1.81	0.08	0.94	1.11	0.32	118	19.6
Orchard No. 9							
9a	1.89	0.06	1.04	1.89	0.30	145	21.3
9b	2.48	0.13	2.12	2.32	0.61	200	40.4
9c	1.72	0.05	1.11	1.11	0.42	90	12.4
9d	1.82	0.04	0.92	1.32	0.32	145	16.9
Orchard No. 10							
10a	2.12	0.10	1.02	1.82	0.36	148	22.9
10b	2.22	0.09	1.12	2.11	0.42	158	26.4
10c	2.42	0.10	1.96	2.21	0.56	200	32.3
10d	2.02	0.06	0.72	1.01	0.32	84	11.6
Mean	2.1	0.09	1.4	1.76	0.62	159.2	27.1
CV (%)	15.45	29.02	28.47	21.14	36.35	16.4	15.8

Total number of units/observations = 40

Table 4. Leaf nutrient composition in relation to fruit yield in Khasi mandarin orchards in Manipur

Orchard No.	Micronutrients (ppm)				Fruit yield	
	Fe	Mn	Cu	Zn	No./tree	(kg/tree)
Orchard No.1						
1a	226.3	61.9	3.4	28.2	310	46.8
1b	210.4	52.8	2.8	24.6	210	38.4
1c	218.4	44.6	1.4	22.2	180	32.0
1d	222.2	32.3	3.4	17.8	140	20.3
Orchard No.2						
2a	118.4	33.2	1.4	18.0	140	18.4
2b	179.8	42.4	1.2	20.4	240	28.2
2c	204.3	44.2	2.8	21.2	220	22.0
2d	210.6	43.1	3.1	20.4	200	24.6
Orchard No.3						
3a	214.0	53.8	3.8	27.9	195	40.4
3b	218.6	61.4	2.8	23.6	170	32.2
3c	210.4	64.4	1.7	28.2	220	36.2
3d	178.6	58.9	2.0	21.2	195	28.2
Orchard No.4						
4a	204.3	54.6	2.2	17.2	110	20.6
4b	192.4	61.8	3.2	17.6	150	22.7
4c	178.1	79.6	1.8	18.1	100	18.4
4d	142.4	81.2	2.1	21.2	160	30.0
Orchard No.5						
5a	214.2	69.4	2.2	19.2	100	19.4
5b	119.4	92.4	2.3	22.3	200	36.4
5c	136.8	64.3	3.1	18.4	110	21.0
5d	172.8	71.2	1.9	26.3	190	32.3
Orchard No.6						
6a	224.2	78.4	1.3	21.4	150	30.4
6b	178.4	72.2	1.4	18.2	135	28.3
6c	192.0	61.4	1.1	16.8	80	18.2
6d	198.6	74.6	2.8	31.2	190	42.3

Orchard No.7						
7a	178.4	61.3	1.0	19.2	140	20.3
7b	218.3	58.2	1.2	17.8	100	19.4
7c	279.4	79.2	3.2	28.4	180	40.3
7d	270.3	61.4	2.1	24.3	140	32.2
Orchard No.8						
8a	261.4	42.8	1.2	20.4	100	18.2
8b	228.4	53.8	2.8	27.0	166	32.6
8c	182.9	52.4	1.8	28.1	158	30.4
8d	172.2	41.2	2.1	18.0	118	19.6
Orchard No.9						
9a	194.6	82.0	1.7	20.4	145	21.3
9b	282.3	92.3	2.4	29.4	200	40.4
9c	211.4	61.0	3.2	17.2	90	12.4
9d	189.3	81.2	2.8	14.6	145	16.9
Orchard No.10						
10a	182.2	48.2	2.6	22.1	148	22.9
10b	192.2	52.3	2.2	24.3	158	26.4
10c	214.3	61.9	2.8	28.4	200	32.3
10d	228.4	92.2	3.1	18.1	84	11.6
Mean	201.3	61.9	2.3	22.0	159.2	27.1
CV (%)	18.21	25.52	33.16	19.72	16.4	15.8

Total number of units/observations = 40

Table 5. Diagnosing the fertilizer requirements

Orchard no.	**Mean yield (kg/tree)**	**Macro nutrients removed by Khasi mandarin fruit (in mg/tree)**					**Micro nutrients removed by Khasi mandarin fruit (in mg/tree)**	
		N	**P**	**K**	**Ca**	**Mg**	**Zn**	**Cu**
1.	34.38	171.9	17.19	34.38	68.76	17.19	0.34	0.20
2.	23.30	116.50	11.65	23.30	46.60	11.65	0.23	0.13
3.	34.25	171.25	17.12	34.25	68.50	17.12	0.34	0.20
4.	22.93	114.65	11.46	22.93	45.86	11.46	0.22	0.13
5.	27.27	136.35	13.63	27.27	54.54	13.63	0.27	0.16

6.	29.80	149.00	14.90	29.80	59.60	14.90	0.29	0.17
7.	28.05	140.25	14.02	28.05	56.10	14.02	0.28	0.16
8.	25.20	126.00	12.60	25.20	50.40	12.60	0.25	0.15
9.	22.75	113.75	11.37	22.75	45.50	11.37	0.22	0.13
10.	23.30	116.50	11.65	23.30	46.60	11.65	0.23	0.13

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