



SARDAR VALLABHBHAI PATEL  
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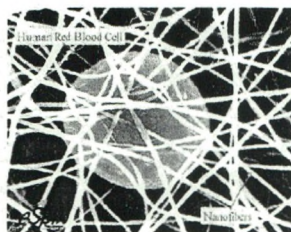
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# Recent Trends in Textile Technology & Management

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# DEVELOPMENT OF NEW TYPES OF SEWING THREADS FROM COMPACT AND CONVENTIONAL YARNS

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## ABSTRACT

Compact spinning, which is a modified version of ring-spinning, produces a novel yarn structure, and the development of compact spinning has set new standards in yarn structure. In this study the area which merits consideration is the development of new types of sewing threads which have been produced from compact and conventional yarns. The yarn properties of the produced sewing threads were analysed using ASTM method. The functional dependencies of selected fundamental parameters of yarn quality, such as tenacity, elongation at break, unevenness of linear density, hairiness and the number of faults on the yarn's linear density were tested. The dependencies assessed allowed to calculate the quality parameters of cotton yarns for any given linear mass, and enable the modelling of yarn parameters for manufacturing Sewing Threads which were the object of this research.

## INTRODUCTION

The compact spinning system produces a yarn structure which is different from the structure of yarn spun by the conventional spinning system yarn structure as a result of the elimination of the spinning triangle. High strength, decreased hairiness and high elongation values are distinctive features of compact yarns. Artzt, P., 2002. The basic alteration in the compact spinning system, which is the modified form of the ring spinning system, is that the drawing system of compact spinning machine finishes with a condensation zone formed with the aid of air suction. In this way, the spinning triangle is eliminated, which is at the same time the strongest and weakest feature of ring spinning with regard to other systems; thus a better orientation of fibers in the yarn is achieved Achnitz, R., et.al, 1999, Meyer, U., 2000. Anonim , 2002. Compact yarns enable the finished textile products to have higher strength, a brighter appearance and better handle. The tendency to pill decreases as a result of much lower hairiness Salhotra, K.R., Ishtiaque and Kumar (2003).

New perspectives introduced by compact spinning have proved their worth in all textile processes from yarn production until the finishing stage. Research on compact yarns, their quality, and the structure of compact and classical yarns is found in the work of Jackowski, Cyniak,(2004) & Czekalski, Krifa & Ethridge,(2006) and Basal & Oxenham.(2006)

This research deals with the production yarns made from compact and conventional method. This study focuses on identifying a spinning system which could help the industry to produce compact yarns with comparatively superior yarn characteristics than the regular ring spun yarns

## MATERIALS AND METHODS

Compact and Conventional cotton yarns of 30's count were used for the sewing thread production. Single ply yarn was produced from the cotton using Compact and conventional ring spinning systems. Then, the single ply yarns were shaped into sewing thread by passing it through the production steps : rewinding, doubling, twisting,(2 ply & 3 ply) mercerizing, bleaching, dyeing, wax finishing and oil finishing were given to the sewing threads. Both wax and oil finishing were used as thread lubricant to overcome the problem of the tendency melting due to heat generated by the needle at very high speed stitching. The details of the sewing thread samples are given in Table -1.1

**Table -1.1 Details of Compact and Conventional yarns**

S. No	Nomenclature	Sewing thread	Composition	Tkt no	Tex	Ply	Finish
1.	Compact Wax-2 ply	Compact	cotton	150	20	2	wax
2	Compact oil - 2 ply	Compact	cotton	150	20	2	oil
3	Compact Wax-3ply	Compact	cotton	150	20	3	wax
4	Compact Oil - 3ply	Compact	cotton	150	20	3	oil
5	Conventional Wax-2ply	Conventional	cotton	150	20	2	wax
6	Conventional Oil -2 ply	Conventional	cotton	150	20	2	oil
7	Conventional-Wax -3 Ply	Conventional	cotton	150	20	3	wax
8	Conventional-Oil - 3 Ply	Conventional	cotton	150	20	3	oil

### Spinning particulars for Compact yarns Tex 40s Ne

PARAMETER	details
Yarn TM	3.8
Spindle speed (Avg.)	18000 rpm
Ring dia in mm	38mm
Cop content	45-55gm
Break draft	1.19
Spacer in mm	4 mm

Polyester sewing and spun polyester sewing threads dominate the apparel industry because they provide durable and stable seams with good seam performance. Hence Commercial Polyester wrapped polyester core, Cotton covered polyester core and staple spun polyester sewing threads were selected.

In the compact spinning system, eliminating the spinning triangle almost entirely in the yarn formation zone allows even very short fibers to contribute to strength in this zone where fibers have no twist. In this way, the spinning tension existing in this zone is received by all fibers. Thus breakages during yarn production decrease, and therefore the spinning stability increases. Hence Cotton Compact and Conventional yarns were manufactured to find out their efficiency as sewing threads.

## **RESULTS AND DISCUSSIONS**

### **4.1 Yarn testing**

There is significant increase in tenacity of compact yarns when compared to conventional yarns. The CV% of yarn strength was very less for compact which shows the improved uniformity. The binding of the surface fibres in the compact system and a good packing density are responsible for the improvement in the tenacity.

### **4.2 Yarn Elongation**

The compact yarns exhibited a reduction in elongation % when compared to ring spun yarns. This may be due to increased compactness and packing density, which restricted the relative movement of fibres.

### **4.3 Yarn Evenness**

The evenness of the compact yarns of 3 ply was higher than that of the conventional yarns. The conventional 2 ply showed a less unevenness value than the other yarns.

### **4.4 Yarn imperfections**

When the yarn imperfection was studied, it was found that the compact yarns showed better yarn imperfections than conventional yarns. This is due to pneumatic and magnetic compaction that is involved in the production of compact yarns, which was mainly responsible for the increase in strength apart from better integration of fibres inside the compact yarn structure. High yarn perfection of compact yarns may be attributed by the changes in the drafting area of these systems and not the mere compaction.

Table – 1.2 Properties of Compact and Conventional yarns

Parameter	Single		Compact		Compact		Conventional		Conventional	
	Com pact	Conv entio nal	2 ply		3 ply		2 ply		3 ply	
			Wax	Oil	Wax	Oil	Wax	Oil	Wax	Oil
Yarn count (g/tex)	29.1	29.59	30	30	30	30	30	30	30	30
Yarn count CV %	0.47	0.38	0.49	0.39	0.49	0.39	0.49	0.39	0.49	0.39
Twist per inch	22.57	22.04	27.64	26.60	27.62	27.64	26.24	25.51	26.33	26.43
Single thread strength (gms)	385.4	345.5	671	668	979	920	639	627	643	639
Single thread strength CV%	5.97	6.71	5.41	6.18	7.02	4.31	7.56	5.43	6.84	4.79
Tenacity gms/Tex	19.85	17.55	19.09	18.28	24.95	25.80	18.27	18.19	16.36	14.0
Elongation %	5.40	4.98	7.75	5.40	4.44	7.15	4.37	5.11	3.95	3.77
CV%	5.35	4.98	4.54	5.16	3.18	5.06	7.89	6.75	4.35	5.98
C.S.P	3209	2899	6754	5760	7854	6753	5643	5490	5543	5221
Yarn imperfection Thin-%50	0	0	1	1	5	2	2	3	5	3
Yarn imperfection Thick+%50	16	20	65	48	38	58	46	35	42	51
Yarn imperfection Neps +%200	34	49	56	78	64	59	96	43	52	84
Yarn quality index	12.23	9.10	15.0	14.65	15.1	14.97	12.82	11.85	11.60	10.82
Yarn evenness U %	8.76	9.60	7.32	7.40	7.91	732	9.54	9.64	9.97	9.21

Figure 4.1 Yarn Count and CV% of Compact and Conventional Yarns.

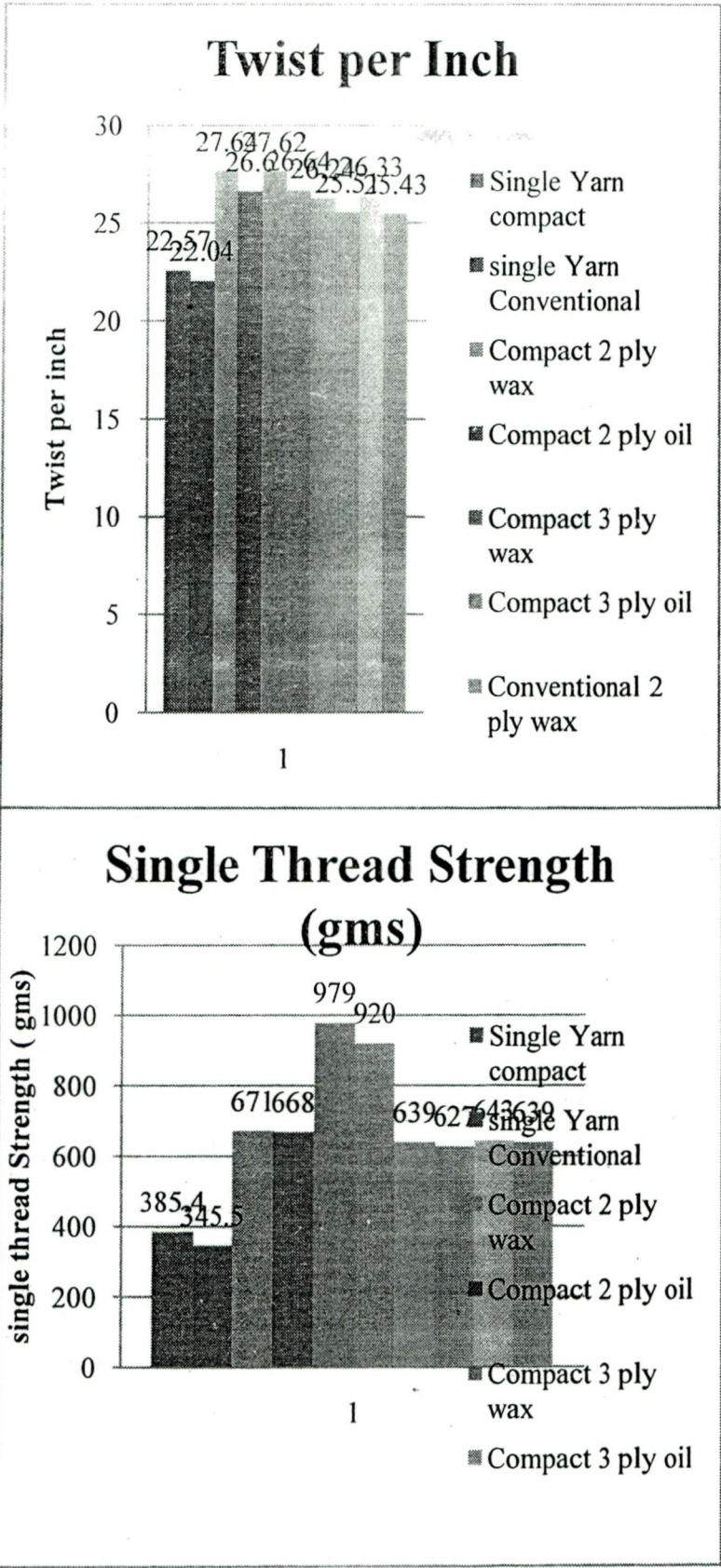


Figure 4.2 Twist per inch and Single Thread strength of Compact and Conventional Yarns.

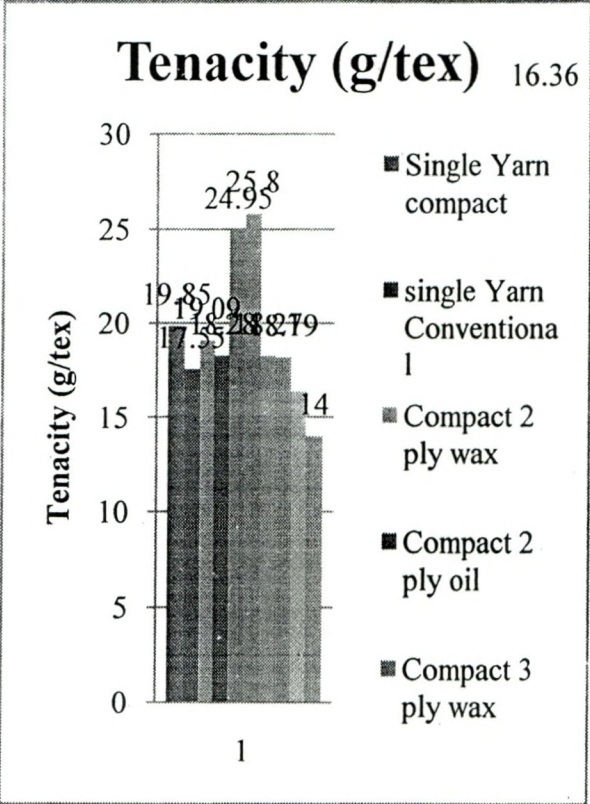
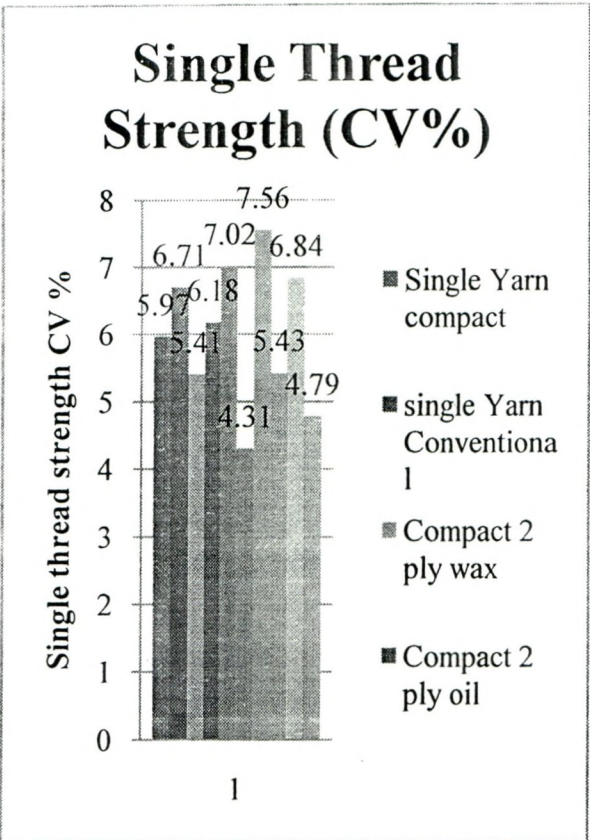


Figure 4.3 Single Thread strength CV% and Tenacity of Compact and Conventional Yarns.

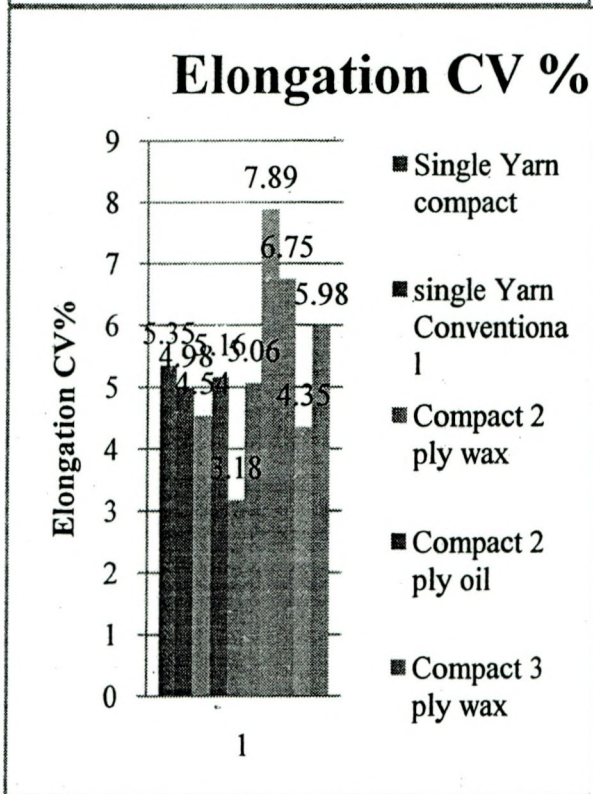
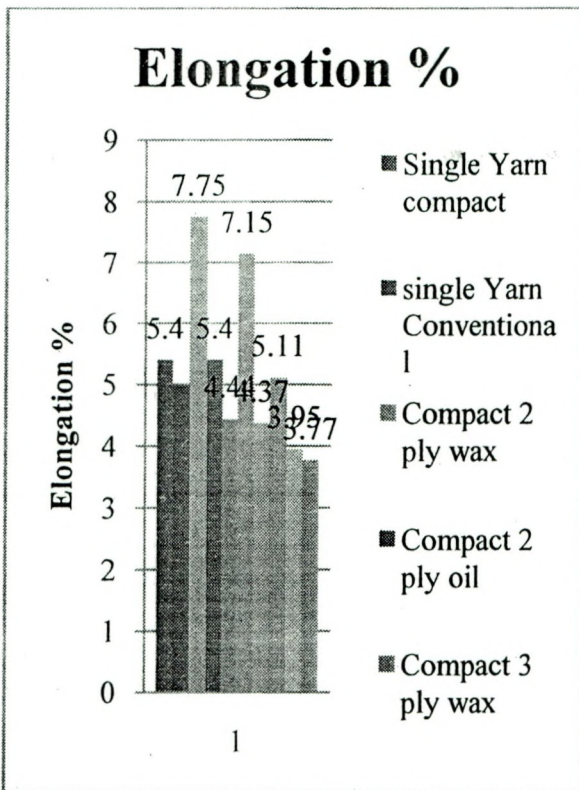


Figure 4.4 Elongation % and CV % of Compact and Conventional Yarns.

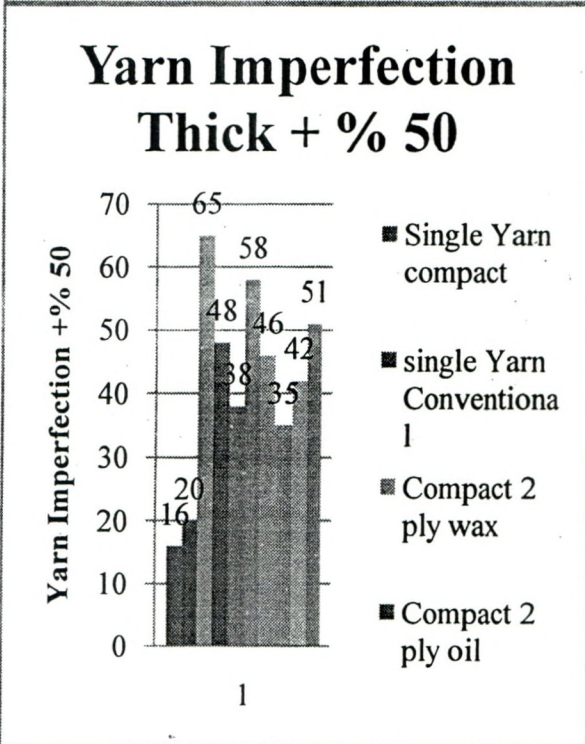
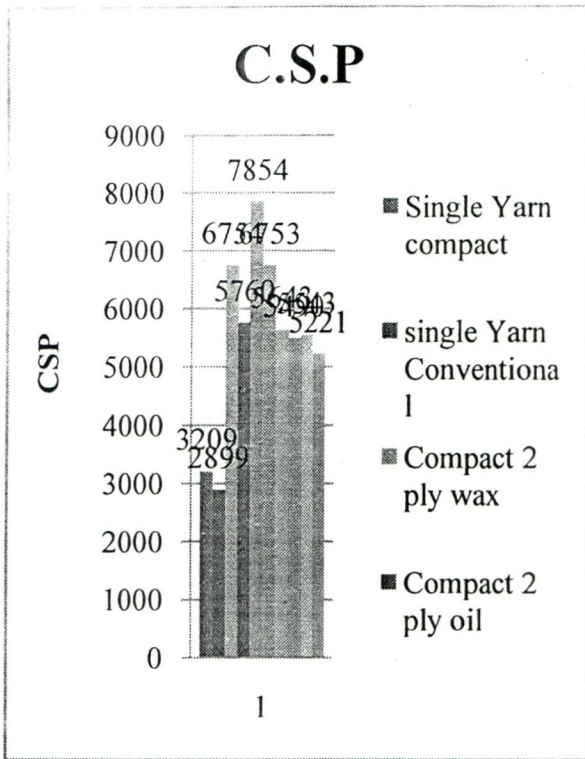


Figure 4.5 CSP and Yarn Imperfection Thick + % 50 of Compact and Conventional Yarns.

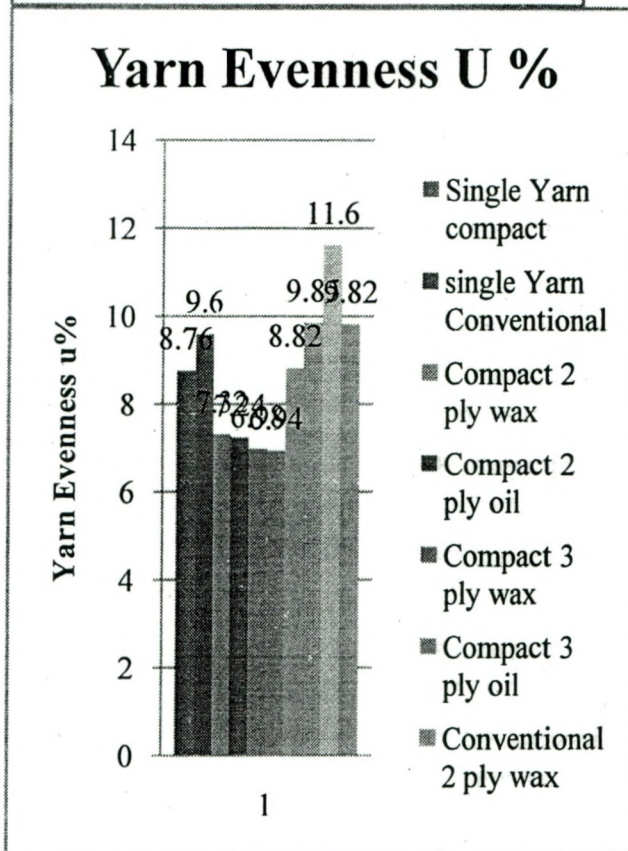
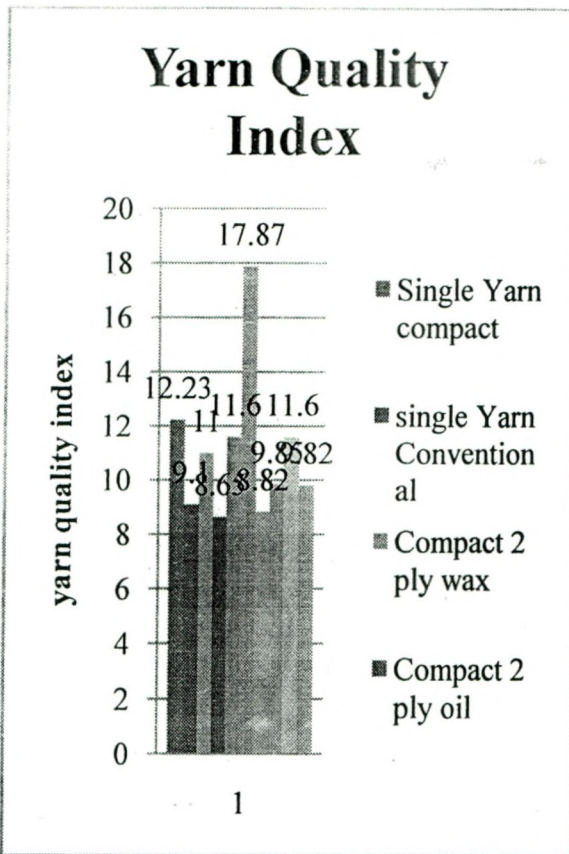


Figure 4.6 Yarn Quality Index and Yarn Evenness U% of Compact and Conventional Yarns.

Table 5.4.1 gives the properties of Compact and Conventional yarns. The compact Single, 2 ply, 3 ply yarns are found to be superior as compared to the Conventional two fold Yarns . the imperfections are also found to be lower in Compact Yarns.

Elongation of the yarn is also found to be higher for the compact yarns in comparison with the conventional yarns.

## 5.5 CONCLUSIONS

The results for compact and conventional yarns indicated the nominal count was found to be 30 Ne for all the eight yarns. On an average, the actual count was found to range between 29.5 to 30.0 and the yarn strength ranged from 671 to 1120 g for the eight yarns and the compact yarn of 3 ply with oil finish as lubricant is found to have 1120g. CV% of yarn strength was found to be between 3.31 and 11.02, unevenness percentage averaged from 7.54 to 12.40, imperfections were found to be between 0-5 % (thin places) , 16-65 % ( thick places) and 34-96 % ( Neps) .The physical characteristics such as single yarn strength, CV% of yarn strength, elongation, yarn evenness, yarn imperfections of the compact yarns were found to be better than the conventional yarns.

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