CHAPTER 1

INTRODUCTION

1.1 GENERAL

Weft knitted fabrics used for garment production must be of high quality. Knitted fabrics provide outstanding comfort qualities and have long been preferred as fabrics in many kinds of clothing. In addition to comfort, knit fabrics also provide light weight, warmth, and wrinkle resistance. The combination of a high order of extensibility, a relatively low average modulus and good recovery properties may be said to be the distinguishing characteristics of a weft knitted structure. Therefore, demand for weft knitted garments has increased many folds over the years in the domestic and export markets. The consumer acceptance of these garments mainly depends on their dimensional stability.

Consumers consider the dimensional change in a garment to be a critical performance characteristic. Some fabric faults such as color loss or pilling can degrade the appearance of a garment but still leave it usable as clothing materials. Other faults such as poor abrasion resistance may appear late in the life of a garment and to some extent, their appearance may be anticipated by judging the quality of the fabric. However, dimensional change can appear early in the life of a garment so making a complaint more likely. The excessive shrinkage or growth of a garment can make that item unwearable. Dimensional stability of weft knitted fabrics has been one of the most discussed areas within the textile industry as well as in research fields.
1.2 FACTORS AFFECTING DIMENSIONAL STABILITY OF WEFT KNITTED FABRICS

Weft knitted fabric quality is decided by few physical parameters namely loop dimensions, areal density, fabric width, dimensional stability and defects in the fabrics. Dimensional stability is the ability of textile materials to maintain or return to its original geometric configuration. The dimensional stability of a weft knitted fabric is a measure of the extent to which it keeps its original dimensions subsequent to its manufacture. It is possible for the dimensions of a knitted fabric to increase, but any change is more likely to be a decrease or shrinkage. The manufacturing of the weft knitted fabric posses many challenges to the knitter. The knitted fabric characteristics are influenced by the constituent fibres, yarn properties, knitting machine variable, processing and finishing treatments. Dimensional property of a knitted fabric is greatly influenced by the fibre characteristics, yarn characteristics, knitting machine parameters (stitch length, machine gauge, knitting tension), processing and finishing methods, washing and drying methods (Suh 1967).

Structural parameters of knitted fabrics, as well as finishing processes directly influence their mechanical and physical properties and thus are closely connected with wearing properties of knitted garments. Garment shrinkage (due to laundering, dry cleaning, steaming or pressing) occurs at three levels: fabric, yarn and fibre. The total observed shrinkage is the resultant shrinkage at these three levels. The contribution of each to the total depends on both the fabric and yarn structures as well as the nature of the fibre. For example, cotton fabrics may shrink as much as 10% under conditions that cause only 2% shrinkage in the component fibres and yarns. In cotton fabrics, in general, shrinkage occurs principally at the fabric level. Rayon fabrics, on the other hand, exhibit most of their shrinkage at the fibre
and yarn levels. Fibres like cotton it is negligible and for other fibres like rayon, it can be studied independently (Mehta and Bhardwaj 2006).

1.3 SCOPE AND PROBLEMS ASSOCIATED WITH VISCOSE

Munden (1959, 1960) and Doyle (1953) extensively investigated the dimensional properties of wool and cotton weft knitted fabrics and predicted that the length of the yarn in the knitted loop plays a major role in determining the dimensions of a knitted fabric. The dimensional and physical properties of weft knitted fabrics, particularly made with cotton, wool and acrylic have been studied in some detail by many investigators. However, not much has been reported for plain knits of 100% spun viscose rayon. Parmar and Srivastava (1999) suggested that efforts were being made to make a knitted fabric more comfortable by changing the fibres, yarn parameters (twist, bulk, count and finish), knitting parameters (course density, wales density, and stitch length and fabric weight) and post knitting finishes (enzyme and chemical).

There has been a growing demand for moisture absorbent fibres. Viscose rayon fibres are moisture absorbent, easy to dye, comfortable, drapes well, soft to the skin and have a silk like aesthetic. Viscose is very amorphous, its filaments or staple fibres are weaker than cotton and have only a fair tenacity. The shorter polymer and very amorphous nature of the regenerated cellulose fibres are responsible for the much greater sensitivity of these fibres to acids, alkalis, bleaches, sunlight and weather when compared with cotton. The problems with viscose are sensitive to chemicals and shrinks easily when washed in the wrong way.
1.4 RESEARCH OBJECTIVES AND THE OVERVIEW OF THE THESIS

The research work presented in this thesis has been carried out to study the effect of stitch length, yarn twist, fabric structure, compacting, resin, ultrasonic waves and various types of regenerated cellulosic fibres on the dimensional properties of spun viscose single jersey knitted fabrics. The new instrument has been designed to measure the wet yarn shrinkage. An attempt has been made to study the effect of wet yarn shrinkage on the dimensional properties of spun viscose single jersey knitted fabrics. The following objectives were considered for this research work.

1. Design and development of an instrument for measuring wet yarn shrinkage and to study the effect of wet yarn shrinkage on dimensional properties of spun viscose single jersey knitted fabrics.

2. Study the effect of yarn twist and stitch length on dimensional properties of spun viscose single jersey knitted fabrics.

3. Study the effect of fabric structure and stitch length on dimensional properties of spun viscose weft knitted fabrics.

4. Study the effect of compacting, resin and ultrasonic waves on dimensional properties of spun viscose single jersey knitted fabrics.

5. Study the effect on various types of regenerated cellulosic fibres (Viscose, Modal and Lyocell) and stitch length on dimensional properties of single jersey knitted fabrics.

The thesis is divided into 9 chapters. Chapter 1 explains the reason for this study and objectives of the research work. Chapter 2 contains detailed
literature review. Chapter 3 is concerned with materials and methods. Chapter 4 is concerned with design and development of an instrument for measuring wet yarn shrinkage. Results and discussions are covered in chapters 5 to 8. Chapter 5 deals with the effect of yarn twist and stitch length on dimensional properties of spun viscose single jersey knitted fabrics. Chapter 6 is concerned with effect of fabric structure and stitch length on dimensional properties of spun viscose single jersey knitted fabrics. Effect of compacting, resin and ultrasonic waves on dimensional properties of spun viscose single jersey knitted fabrics is discussed in chapter 7. Chapter 8 deals with the effect on various types of regenerated cellulosic fibres (Viscose, Modal and Lyocell) and stitch length on dimensional properties of single jersey knitted fabrics. Summary and conclusions from the research work presented in chapter 9.