CHAPTER V
SUMMARY AND CONCLUSION

Plaster of Paris was first studied as resist material by Parul (2002). She found that plaster of Paris was the best among non-wax resist materials. It gave perfect white resist and finest crack effect; produced greatest aesthetic appeal and sharpness of outlines; it did not need cooking or reapplication like starches; and it was cheaper and easier to use. Further experiments were done by Chauhan (2004) to see the performance of Plaster of Paris on different cotton fabrics with azoic dye. She found that POP can be as effective with hot bath dyes as with the cold bath dyes. It suggested that there is a lot of scope of using plaster of Paris with different types of dyes on different types of fabrics like silk, cotton, wool, polyester, jute, etc.

In continuation of the above said studies the present study was conducted with the following objectives.

1. To study the compatibility of Plaster of Paris resist paste with different hot bath dyes on different fabrics.
2. To compare the efficacy of different brands of Plaster of Paris as resist material.
3. To investigate the effect of Plaster of Paris resist paste on physical properties of the fabrics.
4. To explore the various application techniques for Plaster of Paris resist paste.

The experiments were carried out in the Department of Clothing and Textiles, Faculty of Home Science, Banasthali Vidyapith, Rajasthan. The fabrics used for the experiments were Acrylic, Cotton, Jute, Polyester, Silk and Wool. To study the performance of Plaster of Paris resist with different dyes, five natural and five synthetic dyes were used. Performance of five brands of Plaster of Paris was compared to select the best one. Effect of POP resist on weight, stiffness, drape, strength and absorbency of fabrics was also investigated. Experiments were
also conducted with different application methods for POP paste namely block, screen, stencil, brush, drop and spray.

The results are summarised as follows. It was found that POP of different brands were not applicable using same consistency of paste. They needed different amounts of water to be added to make a paste easily applicable on fabric using a painting brush. The brands of POP differed in their performance as resist material.

**Performance with synthetic dyes:** Among the samples dyed with synthetic dyes the four samples i.e. silk dyed with direct dye, silk dyed with acid dye, silk dyed with basic dye and polyester dyed with disperse dye were rated excellent for sharpness of outlines, whiteness of reserved area and overall aesthetic appeal. Best results were of POP resist were with basic dye on silk and disperse dye on polyester. Second best results were of direct dye on silk and third best were of acid dye on silk. Out of three dyes used on cotton best resist effect was obtained with reactive cold dye. Out of the dyes used on wool, the resist effect was most appealing with basic dye. Resist effect of POP on jute was equally good with basic dye and reactive cold dye. On acrylic the resist effect was better with disperse dye than with basic dye. On comparing fibres, it was noticed that the resist effects obtained on silk, polyester and wool were better than on cotton, jute and acrylic.

**Performance with natural dyes:** Among natural dyes Sun yellow, blood red and lac dyes gave better outlines of the POP reserved area. Indigo and garnet brown natural dyes yielded comparatively less sharp outlines than other dyes. The use of sun yellow, blood red and lac dyes resulted in better whiteness of the POP reserved area. Indigo and garnet brown natural dyes gave comparatively less white resist than other dyes. It can also be noticed that best whiteness of reserved area was obtained on silk.
In the experiments of POP resist with natural dyes best results were of sun yellow and lac on silk fabric. Second best results were of sun yellow on wool and blood red on silk. Sun yellow, blood red and lac dyes gave better effects with the POP resist technique than indigo and garnet brown natural dyes. It can also be seen that best results were obtained on the silk fabric.

**Change in physical properties of fabrics:** On measuring different physical properties of fabrics before and after POP application the following results were obtained.

The bending length reading of polyester fabric and of wool warp wise samples had increased but of other fabrics had decreased after application and removal of POP paste. This meant that all fabrics except polyester and wool warp wise sample became softer after removal of POP.

The reading of crease recovery of polyester, jute, and silk warp wise samples increased but of other fabrics decreased after application and removal of POP resist. This meant that polyester, jute and silk warp wise samples become more crease resistant.

It was found that the sinking time of jute and cotton fabric decreased after removal. Acrylic, polyester and silk didn’t sink at all but kept floating to the surface of water. Wool fabric didn’t sink completely but only 70-75% portion of fabric went under water and rest of the portion kept floating on the surface of water.

The drape coefficient of all the fabrics decreased after application and removal of POP. This implied that all the fabrics when hung, showed more number of folds after removal of POP.

The weight of all the fabrics increased after removal of POP. This means that all the fabrics became heavier after POP removal.
In acrylic warp wise, jute weft wise and cotton weft wise samples reading of elongation and load decreased. But in acrylic weft wise and polyester weft wise the reading of elongation and load increased. In polyester warp wise, jute, silk and cotton warp wise samples the elongation reading increased and of load decreased. The wool and silk weft wise samples the reading of elongation and load increased.

**Application methods:** It was found that POP when applied with brush on both the sides of the fabric and dyed whether with cold or hot dye, the resist effects were good to excellent. When the POP paste was applied on single side of the fabric and dyed whether it was a cold dye or hot dye, gave unsatisfactory resist effect.

After application of POP, crack could be developed by applying pressure with the hand in the middle of the sample. In the process of incorporating crack POP remained stuck to the thick fabrics i.e. wool, cotton, jute, acrylic, but on silk and polyester POP detached from the fabric. Cracks made the resist layer vulnerable and the resist effect risky. Brush application with crack was not successful on silk and polyester fabrics. On other fabrics the resist effect was good to very good.

The POP paste made with water was little difficult to apply with cone because POP used to set quickly at the hole of the cone which blocked the passage of the paste, so Alpin was used to clear the hole. The paste made with fevicol was easier to apply with cone as fevicol delayed the setting time of POP due to which the hole at the tip of the cone didn’t get blocked so quickly as well as the resist effect was also much whiter than of POP only. Application with cone was successful only with cold dye and not with any of the hot dye. With reactive cold dye the result was satisfactory on cotton and jute only but not satisfactory on wool and silk fabric.
It was observed in the spray application experiment that POP paste applied by spraying with the help of tooth brush gave non-satisfactory result, whether it was dyed with a hot dye or a cold dye.

The resist effect of paste applied with stencil made from OHP sheet was not good even when if it was used with different types of pastes prepared by varying the additives (water, gum water, fevicol, fabric glue) neither on single side nor on both sides and neither with cold nor with hot dye. It was because the paste layer could not be thick and strong enough to resist the dye penetration. Reduction of dyeing time also could not make much difference in the result.

POP paste applied on both sides of the fabrics with stencil made from enamel painted cardboard gave good to excellent resist effect with hot as well as cold dyes, and natural as well as synthetic dyes. Stencil made of plastic was also tried but the resist edges were broken and distorted down while taking out the stencil from the fabric surface and it was not found suitable for dyeing.

The best resist effect obtained from drop technique (rated good) was with cold dye on cotton by adding fevicol to the POP paste as the resist effect was whiter but the fabric after removal of paste was stiffer. The resist paste of POP with water or on addition of fevicol, gum, fabric glue and binder could not be applied satisfactorily through nylon and organdy screens.

The resist paste of POP with water or on addition of fevicol, gum, fabric glue and binder could not be applied satisfactorily using wooden blocks, neither line design blocks nor solid fill blocks.

**Comparison with other resist materials:** Application of wax needed care that the wax is neither too hot to run out of design outlines nor too cold to apply. Its removal was also time consuming. Its resist effect on the four natural fibres was very good. Equal efforts were needed in application of POP paste, wax and white cement paste. Cooked flour pastes and wall putty paste were difficult to apply in comparison to the above three. Removal of POP
resist was the easiest. Starches were slightly difficult to remove and removal of wax was comparatively difficult. The removal of white cement and putty were very difficult. The resist effect was excellent with POP, very good with wax and fair with starches. Resist effect could not be obtained with white cement and putty due to fabric damage.