CHAPTER VII

CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The research was done on corn drying in a spouting column of 1.8 metres in height by 10 cm diameter, with cone angle of 35°. The Flow of 10-psi air at 1270-1370 Lit/min caused the spouted bed to spout to the height of 40 cm. The drying was performed at 40°, 45°, and $50^\circ C$. The experimental data were analysed and led to the following drying equation,

$$\overline{\overline{M}} = 1 - \underline{2}. \, X + 0.236X^2$$

$$\text{where} \quad X = \underline{\underline{S}} \, \sqrt{\mathcal{D}\theta} \, \sqrt{\pi}$$

The drying equation was derived on the assumptions of drying of uniform, nearly spherical, solid particles in a well-mixed, isothermal bed, with the drying rate controlled by moisture diffusion within the particles and the diffusion coefficient independent of concentration. The diffusion coefficient was given as

$$\mathcal{D} = 4080 \exp \left(-13930/\mathcal{R}\, T\right)$$

The surface moisture content, m_s, at 70 - 75 % relative humidity and at $40 - 50^\circ C$ is 0.1518 gm/gm, dry basis. The proposed drying equation facilitates the prediction of drying rates, energy requirements, and safe and economical limits of operation for spouted-bed corn dryers.

7.2 Recommendations

Recommendations for further research are given as follows:

7.2.1 The effect of bed depth for the same column on the drying rate should be studied.

7.2.2 In economical aspect, a cooling column receiving shelled corn from the heater should be included into the unit in order to make use of the sensible heat from the heater to further dry the corn in the cooler.

7.2.3 The drying equation evaluated should be checked of its validity with other operating conditions.

7.2.4 Since the nutritive values of corn are affected by high inlet air temperatures (above $54^{o}C$) nutritive tests before and after dryings are necessary.