Chapter 7
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CONCLUSIONS

Following conclusions are drawn from results obtained from the present study:

1. In all methods of chillies drying (both varieties, i.e., Jwala and Pusa Sada Bahar), the combined pre-treatment of destalking and punching was found to be the most effective pre-treatment, as the drying time taken chillies samples under the pre-treatment was less than other pre-treatments.

2. Pre-treatments, such as, punching, destalking, destalking and punching were effective in reducing drying time upto the required final moisture content, i.e., 9-10%, but affected the quality (pungency and colour) of dried chillies. Untreated samples of chillies were having more pungency and good colour than pre-treated ones.

3. The drying time upto the required final moisture content (9-10%, db) for both varieties of chillies, was the least for the fluidized bed (mechanical) drying, followed by the solar cabinet drying, the greenhouse type solar drying and the open floor sun drying.

4. The quality of dried chillies of both varieties was found to be the best in the fluidized bed (mechanical) drying, followed by the greenhouse type solar drying, the solar cabinet drying and the open floor sun drying, where quality of dried chillies was very poor.

5. The open floor sun drying method of chillies drying was found to be the most economical method of drying, followed by the greenhouse type solar drying, the solar cabinet drying, and the fluidized bed (mechanical) drying. Due to quality related problems associated with the open floor sun drying and the solar cabinet drying the greenhouse type solar drying was found to be the most suitable method of chillies drying, due to its moderate cost-economics as well as very good quality dried chillies. The fluidized bed (mechanical) drying was very unreasonably expensive, hence should be avoided.
In all methods of Thompson seedless grapes drying, the ethyl oleate pre-treatment was found to be the most effective pre-treatment in reducing the drying time, due to, its ability to create microstructures on the outer surface (epidermis) of grapes. In all methods of grapes drying of grapes treated under ethyl oleate pre-treatment took the least drying time in drying upto the required final moisture content (15-18%, db), followed by milk treated, sulphur treated and untreated samples of grapes.

The drying time required for the drying of Thompson seedless grapes upto the required final moisture content (15-18%, db) was the least for the fluidized bed (mechanical) drying, followed by the solar cabinet drying, the greenhouse type solar drying, the open floor sun drying and the portable rack (wire net) solar drying.

The quality of dried grapes (raisins) was found as the best in the fluidized bed (mechanical) drying, followed by the greenhouse type solar drying, the solar cabinet drying, the open floor sun drying and the portable rack (wire net) solar drying. Quality of raisins produced from the open floor sun drying and the portable rack (wire net) solar drying was very poor.

The open floor sun drying method was found to be the most economical method of grapes drying, followed by the greenhouse type solar drying, the solar cabinet drying, the fluidized bed (mechanical) drying and the fluidized bed (mechanical) drying. However, due to, quality related problems associated with raisins produced in the open floor sun drying the portable rack (wire net) solar drying and the solar cabinet drying, the greenhouse type solar drying was found as the most suitable method of grapes drying, due to its moderate cost-economics and very good quality raisins produced. The fluidized bed (mechanical) drying was found very unreasonably expensive one, hence, should be avoided.

Thus, the present study confirms that application of solar energy technology i.e. solar driers for food processing (chillies and grapes in the
The present study) is a cost-viable and environmentally benign option, in comparison to other existing energy systems available for the food processing.

SUGGESTIONS FOR THE FUTURE RESEARCH:

Following suggestions for further studies are worth pursuing:

(i) The greenhouse type solar drying and solar cabinet drying should be tested on the fields of farmers on large scales.

(ii) Farmers should be made an integral part of design, development and testing stages of any solar drying system.

(iii) The designs of greenhouse type solar drier and solar cabinet drier should be standardised.

(iv) Low cost fluidized bed (mechanical) drier with high capacity should be developed.

(v) Large scale prototypes of chilli punching machine and chilli destalking machine should be developed for their commercial utilization, while keeping in mind their negative impacts on pungency of chillies.

(vi) More studies should be done on storage stability of dried chillies, separately for each pre-treatment and method of drying.

(vii) Large-scale industrial production plants for ethyl oleate should be established in country itself, in order, to reduce our dependence on other countries, for its import.

(viii) More studies should be done on storage stability of dried grapes (raisins), separately for each pre-treatment and method of drying.

(ix) As grape-growing regions have shown an increase, both in area and yield, a special attention should be paid to the brix content of grapes. Varieties with high brix content should be grown up.

(x) More research should be done on cost-reduction of solar drying systems, in order to promote their widespread acceptability among farmers.
(xi) Farmers should be properly educated regarding benefits of solar drying systems.

(xii) A serious and systematic quantitative assessment of environmental and socio-economic implications of solar energy systems should be made, in order, to gain more support for the cause of promotion of solar energy systems, in comparison of other existing energy systems.