

Optimization of ingredient levels of jaggery chocolate by using response surface methodology

■ SHYAM R. GARUD, ARCHANA G. LAMDANDE, P.K. OMRE AND B.K. KUMBHAR

SUMMARY : Jaggery, despite of a low cost, eco-friendly and a viable alternative to sucrose. jaggery chocolate prepared by using skim milk powder, cocoa powder, cocoa butter, emulsifier and flavoring agent per 100g of powder jaggery. Response surface methodology (RSM) was used to prepare and investigate the overall acceptability and textural characteristic *i.e.* hardness of Jaggery chocolate using sensory and penetration test as part of instrumental texture profile analysis. Cocoa, skim milk powder and cocoa butter in per cent were taken as independent variables influencing the product. Colour, texture and overall acceptability taken as responses. Experiments were designed using response surface methodology. The Box-benken design was chosen as it allows reduction in number of experiments without affecting the accuracy of results and to decide interactive effects of variables on the responses. It is concluded from the present study that the chocolate prepared in this study had the sensory rating ranging from 6.00-7.85 for colour, 6.23-7.55 for texture and 6.35-7.5 for overall acceptability. The sensory characteristics were statistically significant at 1 per cent probability level for evaluating the quality. The optimum process conditions for making chocolate using jaggery as sweetener were SMP 20.30 per cent; cocoa powder 10.04 per cent; cocoa butter 25.15 per cent, 30 minute mixing time and 4 hours of conching process. Corresponding sensory attributes were colour 7.2, texture 7.1 and overall acceptability 7.23.

Key Words : Jaggery, Chocolate, RSM, Texture, Sensory, Hardness

How to cite this paper : R. Garud, Shyam, G. Lamdande, Archana, Omre, P.K. and Kumbhar, B.K. (2012). Optimization of ingredient levels of jaggery chocolate by using response surface methodology, *Internat. J. Proc. & Post Harvest Technol.*, **3** (1) : 107-111.

Research chronicle : Received : 17.04.2012; Sent for revision : 04.05.2012; Accepted : 18.05.2012

Chocolate confectionary has been a novelty food item over the years. Consumers of all ages and social classes have been enjoying it in various forms. Commercial chocolate manufacture in present sense started in the 18th century. It has been reported that in India per capita chocolate consumption is around 160 g and is extremely low as compared to developed countries (Anonymous, 2003). Annual per capita chocolate consumption in Briton was about 11.2 kg per year.

Belgium, the second highest consumer was 8.4 kg per capita, while France and Germany's average consumption was 6.7 kg and 4.9kg per year, respectively (Anonymous, 2003).

Pure chocolate bars contain more than 65 per cent cocoa and remaining (35%) consists of necessary and optional ingredients. The necessary ingredients are cocoa paste, cocoa butter and sugar while the optional ingredients are flavorings, emulsifiers, fruits and nuts. The macronutrients content of chocolate depends on manufacturer's recipe but consists mainly of carbohydrate and fat with a small proportion of protein. Riesen (1977) has given the composition of a typical dietetic milk chocolate, which contains approximately 9 per cent cocoa beans, 15 per cent dried whole milk, 7 per cent dried skim-milk, 31 per cent sorbitol, 38 per cent cocoa butter, 0.12 per cent cyclamate, 0.6 per cent lecithin, and 0.01 per cent vanilla.

The composition of chocolate in the U. S. is specified by FDA (1988C). According to these specifications, chocolate

MEMBERS OF THE RESEARCH FORUM

Author for Correspondence :

SHYAM R. GARUD, Department of Post Harvest Process and Food Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, PANTNAGAR (UTTARAKHAND) INDIA
Email : shyam.g8632@gmail.com

Coopted Authors:

ARCHANA G. LAMDANDE, P.K. OMRE AND B.K. KUMBHAR, Department of Post Harvest Process and Food Engineering, College of Technology, G.B. Pant University of Agriculture and Technology, PANTNAGAR (UTTARAKHAND) INDIA