

Title of the Technology: Binding agents in mushrooms for development of meat analogues

General Part-1

Technology Code:- :

Organization Details.

Subject Matter Division : Horticultural Science
Organization Name : ICAR-Directorate of Mushroom Research ,Solan
Regional Station if any : : Not Applicable
AICRP name if any :
(AICRP)
Principal Inventor : Ms. Bindvi Arora
Principal Inventor : Scientist (Food Technology)
Designation:
Principal Inventor Email : bindvi@gmail.com
Principal Inventor : ICAR-Directorate of Mushroom Research, Chambaghat, Solan
Address (HP)

Details of Inventors.

Principal Inventor : Ms. Bindvi Arora
Principal Inventor : Scientist (Food Technology)
Designation:
Principal Inventor Email : bindvi@gmail.com
Principal Inventor : ICAR-Directorate of Mushroom Research, Chambaghat, Solan
Address (HP)
Co-Inventor Name : Dr. Ved Prakash Sharma)
Co-Inventor Email : vpsharma93@gmail.com

Technology Name : Novel mushroom products- mushroom fortified noodles for quality and nutrition

Technology Details.

Major resource : Product and Process
Minor Subject :
Classification : Agriculture
Minor Subject Sub :
Classification : Agricultural research
Technology Group : Product technology
Technology Related To : Novel mushroom product industry

Complete Details of Technology:

Meat analogues are becoming popular because of their healthy image (cholesterol free), simulation of meat-like texture and low cost. Mushrooms form one such source of proteins which can act as meat analogue or can be used for meat replacement. Although sausages made from minced mushroom fruit bodies have poor textural and sensory properties due to different protein characteristics, functional properties and low fat content of mushrooms. Many different binding agents have been used as fat replacers to improve the quality of reduced fat sausages. These aim to improve the flavor, juiciness, mouthfeel and other sensory properties of sausages. Effect of different binding agents (carrageenan, soy protein concentrate, casein and xanthan gum)

at different concentrations on quality characteristics and nutritional properties of mushroom based sausage analogues made with 5% saturated fat was studied. Significant improvement in textural properties (purge loss and emulsion stability) was observed in samples made with carrageenan as binding agent ($P < 0.5$). Compression and springiness values also corroborated the same. Carrageenan is a natural ingredient that comes from red seaweed (also called Irish moss) and is an additive used to thicken, emulsify, and preserve foods and drinks like nut milks, meat products, and yogurt. The incorporation of the same in mushrooms will help in developing mushroom based products that can act as replacement of meat. Sausage samples with xanthan gum were rated as second best after carrageenan samples in terms of textural properties by objective evaluation but subjective evaluation by panellists rated the product as sticky. With carrageenan concentration at 0.8%, purge loss and cook loss of analogue sausages decreased by 59.63 and 55.55% respectively, while yield and emulsion stability improved by 37.62 and 67.49%, respectively, as compared to control. Sausages with SPC and casein were found to be unacceptable by subjective as well as objective evaluation.

Brief Description of Technology Including Salient Features:

Carrageenan gum (0.8%) has been found significantly effective in improving textural, sensory and cooking properties of mushroom based mushroom based sausage analogues made with 5% saturated fat. This button mushroom based sausage analogue because of improvement in texture and emulsification stability act as substitute to meat and hence may be an attractive product for vegans and vegetarians.

Benefits/Utility :

The utilization of fat replacement additives to mushroom based sausage analogues made with added fat will lead to development of mushroom based sausages as meat analogues and this study would further open research for utilization of mushrooms and fungal mycelia for meat replacement. Soya has been in use for years as a meat replacer and with studies in this area would open scope for utilization of mushroom for the same purpose and also for new product development from mushrooms. This would also cater to the large vegetarian population and also to the growing vegan population across the globe.

Precaution With The Technology

Carrageenan even though a plant product, may be used with caution and evaluated for allergies and other effects when incorporated in mushrooms on large scale human trials before commercialization

Impact, If Adopted

Social Impact

Increasing meat prices, global shortage of animal proteins and increased incidence of animal diseases has led to an increase in the direct consumption of vegetable sources of proteins. Also, in India majority of population being vegetarian further appends to the increase in

demand of vegetable sources of protein. Moreover, with the changes in culinary habits across the globe and shift towards vegetarianism, such products will be beneficial as meat replacement products. Availability of such products will motivate people to shift towards vegetarianism and will have ecological advantage as well in the food chain as energy required to produce an animal product is much higher than vegetables. These mushroom based meat analogues can also lead to improvement in nutritional status of people with vegetarian diets.

Target Users/Stake holders : Mushroom entrepreneurs interested in development of unique products for vegans and vegetarians

Technology Contact.

Name : Director
 Email : director.mushroom@icar.gov.in
 Phone Number : 01792-230451
 Fax Number : 01792-231207
 Address : ICAR-Directorate of Mushroom Research,Chambaghat,Solan,Solan-173213

Keyword for Technology: Mushroom, meat, analogue, sausage, binding agent

Technology Development Details Part-2

Project Details : Formulation and process optimization of mushroom products and byproducts utilization (DMR-12)
 (Through which technology was developed)

Technology Validated by Institute Technology Validation Details.

Subject Matter Division : Horticultural Science
 Organization Name(if within ICAR) : ICAR-Directorate of Mushroom Research, Solan

Organization Name(if outside ICAR,Please enter) : --

Year of Release/Adoption(YYYY) :

Country : India

Through Technology Transfer : YES

Is There Any Other Process/Product/Technology that Is : No

Critical Or Contributes To The Successful Use Of Technology

Minimum Temperature :

Maximum Temperature :

Average Temperature :



Applies To (Regional Differentiation)Inform Part-3

Location.

Zone(As per the planning commission)	:	Not Applicable
Sub zone(As per the planning commission)	:	Not Applicable
Agro-Ecological Zone(NBSS & LUP)	:	Not Applicable
AgroEcological Sub Zone(NBSS & LUP)	:	Not Applicable
State Name	:	Not Applicable
District Name	:	Not Applicable

Soil Type/Resource Type.

Soil Order	:
Soil Sub Order	:
Soil great group	:
Soil great sub group	:

Commodity Details.

Commodity	:
Commodity Type	:
Commodity Name	:

Publication Related To Technology Part-4

Research Paper information.

B. Arora, S Kamal, VP Sharma. 2017. Effect of Binding Agents on Quality Characteristics of Mushroom Based Sausage Analogue. Journal of Food Processing and Preservation 41 (5). doi:10.1111/jfpp.13134

