



Summarizing Remarks – Vegetable Proteins in Fermented Foods and Other Products

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In summarizing this plenary part of session H (Vegetable proteins in fermented and other foods) I wish to pay special attention to the most striking differences and similarities that exist between the traditional ways of converting vegetable protein products into safe and suitable foods or food ingredients around the world. Let me start with the differences. Apart from the obvious difference in crops locally available, two others need attention: history and processing.

HISTORY

The Orient, the Middle East, and Africa indeed have a long history of fermented protein foods derived from vegetable sources. Especially the presentations of Fukushima, Winarno, and Hesseltine have shown us how long and strong this tradition actually is. The Western world also has a long tradition of fermented protein foods which, however, are primarily derived from animal sources. As Olsman pointed out, the use of hydrolyzed and autolyzed vegetable proteins as food ingredients in the Western world started in Europe at only the end of the last century.

PROCESSING

In the Far East, one of the important processing steps is often a fermentation by molds like *Aspergillus oryzae* or *A. soyae* for the first step in soy sauce and Miso production or like *Rhizopus oligosporus* for *Tempeh* production. In other parts of the world, a dislike of moldy products seems

to exist. For this reason outside the Far East, bacteria and yeasts traditionally dominate the fermentation of local vegetable or animal sources into protein foods.

In the Western world, the processing of vegetable proteins into food ingredients started with the use of hydrochloric acid for protein-hydrolysis. Later on proteolytic and other hydrolytic enzymes were used as well, as in the case of autolysis of yeast into yeast autolysates or extracts.

This variety of conventional processing methods of vegetable proteins, however, has all over the world one important similarity in common: it serves the purpose of preparing at relatively low cost a fully acceptable, palatable, safe and often very nutritious food or food ingredient by: (a) removing or reducing the level of antinutritional or toxic substances; (b) removing beany or other unpleasant flavors; (c) improving flavor, texture and/or color; (d) achieving preservation; (e) reducing or replacing cooking; (f) improving protein quality or quantity; (g) improving digestibility.

Since we see it as our duty to offer safe and suitable vegetable protein foods or ingredients not only for the affluent society but also for the developing world, I would like to finish with a recommendation, as expressed by Winarno and Fukushima, that there is still a lot to learn from the traditional processing methods both for the production of highly acceptable vegetable protein foods at low cost and for the creation of flavors which have to assist the incorporation of our recently developed protein ingredients into the local diets around the entire world.