

Excerpts from the Discussion

Dr. Glubrecht (moderator): The papers are now open for discussion. Questions for additional information as well as comments and other contributions are most welcome.

Question: On behalf of my country I should express my very deep gratitude to the IAEA for making it possible to learn about very important matters which are of great priority for my country. I would like to ask Dr. Fried whether the concept of sterilization is today a reality in the elimination or eradication of insects or whether it is still a laboratory procedure.

Dr. Fried: The concept, or the active use, of sterile males for control of insect pests is a field reality with certain insect pests, is under field study with other insect pests and is being studied in the laboratory with additional pests. As I mentioned, the screwworm programme was the first successful field programme. There are many field tests going on and so this technique is a reality; however, it must be applied over large areas at one time which means a co-ordinated effort in the area. It means that we have to know the biology of the insect and the ecology in the area, but once these problems are resolved, then it becomes one of the most effective biological methods which attack only the insect species that you are interested in. It has no other effect on the environment and has been successful where it has been utilized.

Question: I would like to put a question to Dr. Elias. He mentioned the feeding studies of irradiated wheat, rice and potatoes. In Latin American countries the basic food is maize and beans. Now the question is, have studies been done on maize and on beans to make sure that the irradiation dose does not cause any problem to these products, which are the staple, everyday diets?

Dr. Elias: The safety evaluation of rice, wheat and potatoes was based on the consideration of what irradiation does to starch and, in fact, maize starch has been investigated by the French. When the results of the recent conference in Geneva will be published, there will be a monograph attached to it which contains all the biological data on maize starch. What this Committee has said is the data and the information on starch are applicable to all cereals where starch is the major product. The radiation effect on starch is merely a breakdown of the production of glucose units, or perhaps some aldehydes and some acids, but no major compound of toxicological significance. It is now possible to apply the information obtained on starch across the board to any vegetable or cereal which is high in starch. So from your point of view the irradiation of maize is not going to create any problems whatsoever.

Question: A question to Dr. Moustgaard as a veterinary specialist in Denmark, if he thinks as a vet that this is the right moment to install in medical veterinary centres the technology for nuclear medicine as a diagnostic and therapeutic science similar to what is used in human medicine. In our country, Uruguay, for example, in the faculty of veterinary sciences, we would like to know whether it would be justified to install a nuclear medicine centre for cattle illnesses, the illnesses of nutrition, parasite illnesses and so on?

Dr. Moustgaard: As far as the use of nuclear techniques in veterinary medicine is concerned, I would like to underline that nuclear techniques, especially the production of irradiated vaccines in preventive veterinary medicine, is of immense importance. I do hope that this technique will gain in popularity in many countries and that projects using irradiated vaccines will be established in many areas. As to the use of nuclear techniques for diagnostic purposes, I think that they can be used hand in hand with the conventional methods we have but for economic reasons I would perhaps be a little afraid of recommending such a radiation facility for the treatment of diseases in individual domestic animals such as cows and sheep, unless they were very valuable animals that are going to be used for breeding purposes.

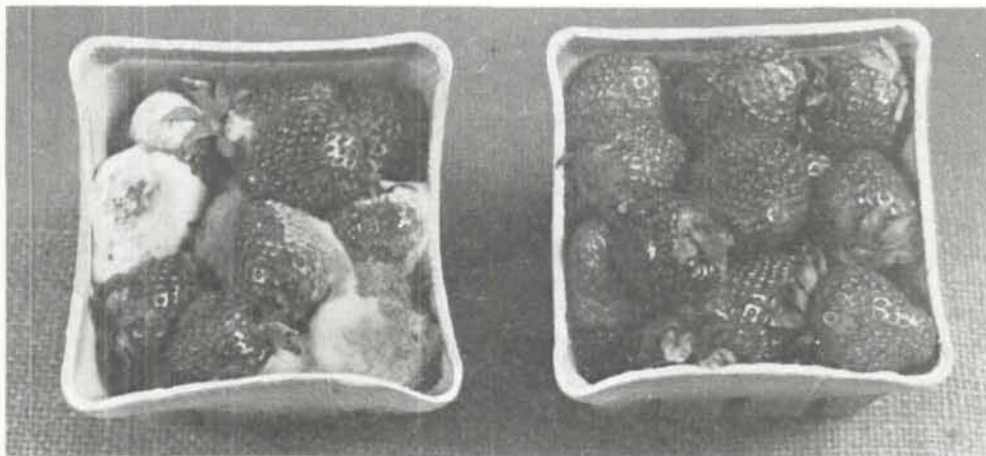
Question: Has there been much commercial food processor interest in food sterilization over the last two or three years? With the results that are beginning to come in, it would seem that there should be a growing interest on the part of large commercial food processors.

Dr. Elias: I think I will try at least to answer part of the question. The food sterilization programme is mainly being carried out in the United States, where they are interested in the sterilization of meat. Basically, for sterilization purposes of some of these food products, you have to use rather high doses. It is a very delicate balance to keep the right dose of irradiation without destroying the flavour acceptability of the food.

Most of the food application has been low-dose irradiation for pasteurization purposes and not for sterilization. Food sterilization has a very powerful competitor in the canning process. One difficulty is that you have to use small packages of foods for sterilization. That immediately affects the cost. So I think we cannot expect very extensive use of irradiation for sterilization of low value food products, but we can foresee a great deal of use of irradiation to keep the micro-organisms down to the normal level as in pasteurization. That can be done and that is economic.

Dr. De Zeeuw: As far as the commercial interest is concerned, I can only report what I know in the Netherlands itself. The cost of irradiation for products like potatoes, onions, chickens, fish, shrimps, is not prohibitive. It is somewhat more expensive but because of the advantages — and especially because of the guarantee that the process is not only a good one but the product is stable afterwards — the commercial people are willing to pay a little bit extra. So the costs are not prohibitive, what has been prohibitive until now is that these products cannot be exported. The Netherlands is a small country and it depends a great deal on the export of these products. But nevertheless, products like chicken, fish, and spices (practically half of the spices in the Netherlands are irradiated because the public health authorities have forbidden the use of ethylene oxide) can be put on the home market.

Dr. Glubrecht: The export problem might be alleviated if a number of irradiated food products are taken up in the Codex Alimentarius, and therewith internationally recommended.



After 15 days at 4°C, non-irradiated strawberries show fungus growth, while the irradiated strawberries are still unspoiled. Photo: U.S. Army Natick Research and Development Center.

Irradiated (75 krad) and hot water dipped (50°C, 2.5 min.) Papino papayas are shown along with untreated fruit after simulated shipping (21 days at 11°C). Photo: South African Atomic Energy Board.



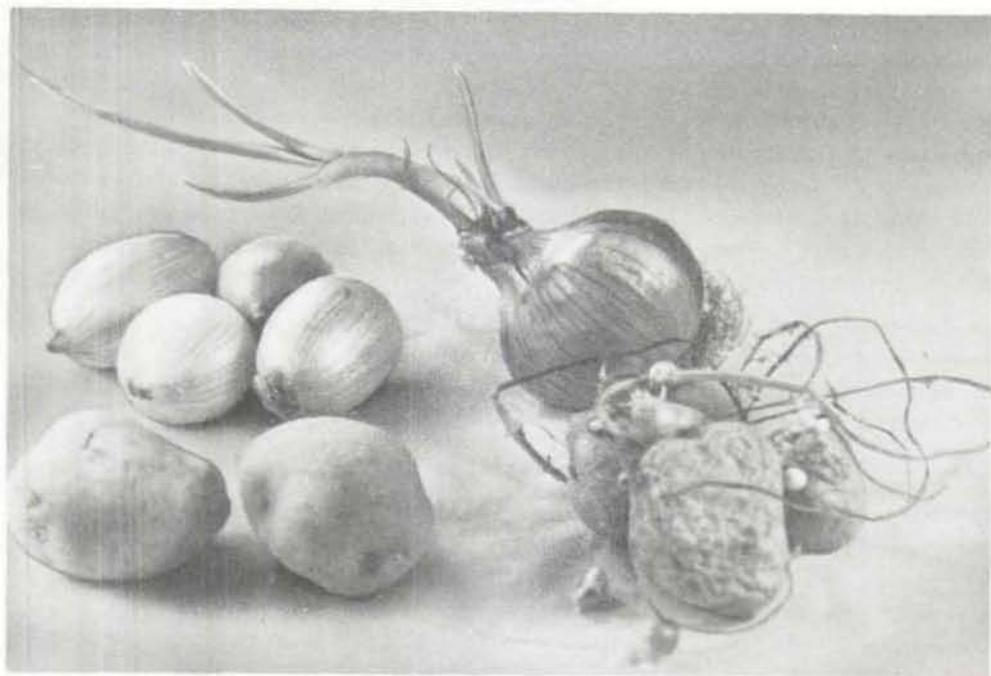
Question: I would like to know whether there is an international mechanism that can provide Brazil as well as other countries the information necessary about more advanced technology for food irradiation, so that throughout the world we can work jointly to solve the problem of food conservation.

Dr. Glubrecht: The JointFAO/IAEA Division of Atomic Energy in Food and Agriculture in Vienna is able to provide information. Also literature and references can be obtained from the International Nuclear Information System (INIS), which is operated by the IAEA. In addition, there exist two other regional institutions which deal with general problems of nuclear methods in agriculture including food irradiation. One is the European Society of Nuclear Methods in Agriculture (ESNA), which has its centre in Wageningen, and we have the present president with us here, Dr. de Zeeuw; the other one is the Indian Society of Nuclear Agriculture (ISNA), which has its centre in the Nuclear Research Laboratory of the Indian Agricultural Research Institute in Delhi. These two societies have newsletters and are in possession of most references which might be of interest.

Question: In the audience are people who work on food irradiation tests for the Nuclear Energy Commission. This subject is of great interest to us. Dr. De Zeeuw presented very well the problem of the need to preserve food through radiation. Brazil has a great need of adopting measures to reduce food losses in general whether they be grains, roots, poultry, fish, etc. This is a condition that I feel is common to all developing countries. Dr. Elias, you talked about the meeting of international experts held in Geneva and the publication that was issued in which it is recognized that from the wholesomeness point of view five items are safe for human consumption. But a translation of the document said this authorization would be temporary in nature for a period of four or five years. This was perplexing to me because I thought the recommendation was unconditional for these five items and the only foods mentioned for provisional authorization were rice, fish and onions. So, Dr. Elias, I would like to ask you as a representative of the IFIP to explain to me as well as to other people who are members of the FDA of Brazil what actually happened at that meeting in Geneva? And, secondly, I would like to know whether they considered irradiation as a process or a food additive?

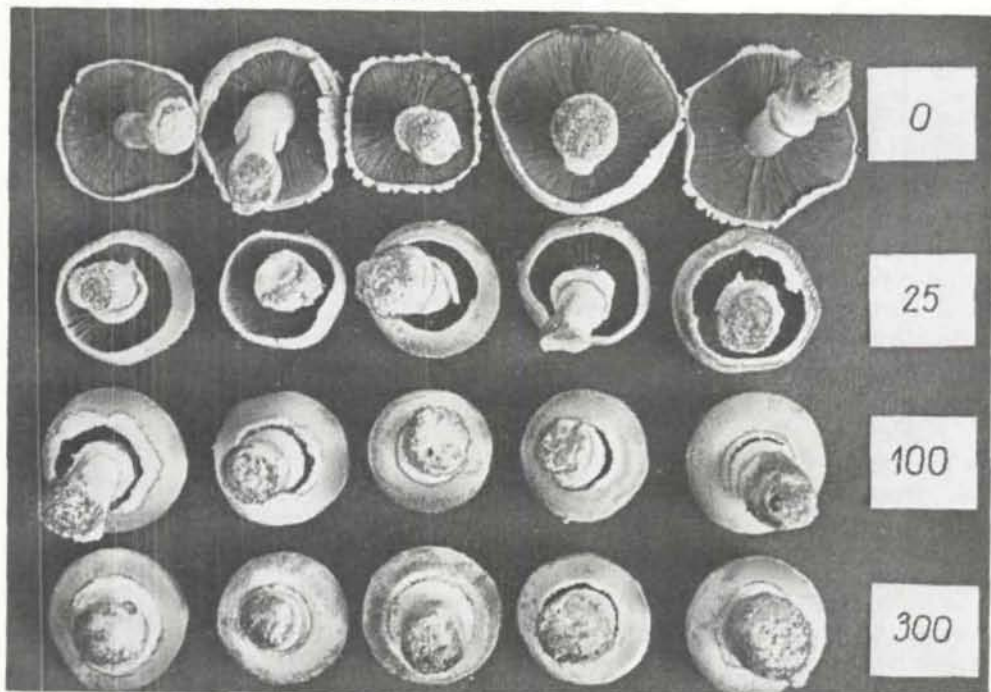
Dr. Elias: You are absolutely correct, there were five items given full unconditional clearance; these are wheat, potatoes, chicken, papaya and strawberries. There is no reason to question the wholesomeness of irradiated wheat, potatoes, chicken, papaya and strawberries. There is no reason to think that there is anything wrong with these materials at the low dose which is being used. They also gave a provisional clearance for rice, fish and onions, and what I have tried to tell you is, provisional clearance does not mean they had any doubts about the safety. There are still some experiments which have been going on for some time and they will take another year or two before they are completed. However, the evidence we had on those three items, fish, onion and rice, is quite sufficient to say it is perfectly safe to use them as food, to eat them, for the next four, five, six years. All we cannot say is that we are absolutely certain you can eat them for thirty or forty years. We can only say that when we have actually seen the results of the studies which are still going on. So, the term "provisional" does not mean you have to wait until the results are in; you can use them, but we cannot say that you can use them for a lifetime.

The second point, which I thought was very important, is that the expert committee has at last agreed that food irradiation is a process and not a food additive. Treating irradiation as a food additive came about because there was no other administrative machinery to deal



Comparison of irradiated onions and potatoes (left) with non-irradiated ones that have been stored for the same length of time. Photo: U.S. Army Natick Research and Development Center.

Irradiation of mushrooms prolongs their shelf life. (Numbers indicate irradiation dose in kilorad.)
Photo: Central Food Research Institute, Budapest.



with irradiated food in the Codex Alimentarius. There was no committee for irradiated foods, and therefore the only existing committee which could deal with irradiated foods in terms of a standard was the food additives committee of the Codex. So, food irradiation was treated as an additive for administrative purposes, and once you label it additive, you make it subject to all the provisions of treating it as if it was a chemical which you add to food, which of course is quite ridiculous. Food irradiation is a process, and not a chemical you add to food. The committee in Geneva has at long last laid this idea to rest. They said food irradiation is a process and irradiated food should not be treated as a food additive but as a processed food.

Dr. Glubrecht: I wish to confirm that what Dr. Elias has said is exactly correct. The international committee can only give a recommendation for clearance, the actual clearance is a national matter, but the recommendation for clearance was unconditional for the five items.

Question: Do you have any comments about the development of irradiated rabies vaccines?

Dr. Moustgaard: In reply to your question I can inform you that there has been work with the production of irradiation-attenuated rabies vaccine, but I do not think it has been put into commercial use. They are still on the experimental stage. There is a lot of interest in producing irradiated vaccines, attenuated vaccines, because it opens enormous possibilities. It would be very valuable indeed if we were able to produce rabies vaccines other than the one we have on the market at the time being, which we are certainly not very happy to use for human beings.

Question: When an irradiated food item has been approved for acceptance at a national level, that is in one country, what procedure must be followed before such food can be exported?

Dr. Elias: To take the case of the United Kingdom as an example, at the moment the law in the United Kingdom says that only food which has been licensed under the food irradiation act can be sold in the United Kingdom. If you had irradiated food and you wished to import it into the UK, you would have to make a submission to the Ministry of Agriculture saying that here is your food, you have irradiated at this dosage and you can use the evidence published by the expert committee or by IFIP, or your own evidence in support of the question of wholesomeness. Then the United Kingdom authorities would put this evidence to their committee which deals with the question of irradiated food and if that committee agrees, then you would get a licence to import the material. I think a more general way would be to have a standard in Codex Alimentarius which is accepted as an international standard for that particular irradiated food. Then that standard would be accepted by Member States, and the food could become an item of international trade.

Dr. De Zeeuw: There is a different legislation in the different countries. For instance, in the Netherlands you require an authorization to irradiate food. When you have permission to irradiate food, then the irradiated food can be marketed. Because you cannot prove whether food is irradiated or not, you should control it at the source.

I think that what the expert committee has done in Geneva will be well known to the governments now and I am going to advise the commercial people in the Netherlands to request other countries to permit the admission of irradiated food on the basis of the advice given by the expert committee.