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Ad Hoc Expert Group Meeting on the
Research and Development of a Small-Scale,
Low-Cost Rice Bran Stabilizing Unit

Vienna, Austria, 6 - 10 December 1976

RICE BRAN STABILIZATION ^{1/}

by

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We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche

RICE BRAN STABILIZATION

I. INTRODUCTION

1. Rice-bran stabilization has been subject of intensive research during the last three decades in many countries. In the United Nations system the existence of the technological gap was recognized for the first time by the Advisory Council for Industrial Research⁽¹⁾ nearly a decade ago and called attention to the need for intensification of research and development as a collective effort in view of its economic importance to all the rice producing countries. The revival of interest in a research project by UNIDO on the stabilization of rice-bran especially from the point of view of developing a low-cost and low-capacity stabilization unit which the average rice miller in the developing countries can afford seems to be well warranted and a step in the right direction. The project that has been sub-contracted by UNIDO to the Applied Scientific Research Co-operation of Thailand (ASRCT) calls for the definition of a suitable technology and specification of the technical parameters. The report of the ASRCT which will be considered at the Expert Group Meeting in Vienna from 6-10 December 1976 will undoubtedly contain up-to-date information on the work so far carried out on the stabilization of rice-bran.

2. This paper has been prepared in accordance with the cable request dated 19 November 1976 received from Mr. W.H. Tanaka, Acting Head of the Development and Transfer of Technology Section, UNIDO, Vienna, Austria. Here an attempt is made to present the view that, apart from the pre-eminent importance of the problem of technology, there are other important issues which have a bearing on economic and social aspects of the rice milling industry and utilization of rice-bran. Stabilization of bran cannot be examined in isolation. A totality of the problems and especially their interrelationship should be examined with a view to arriving at realistic conclusions.

3. The importance of rice milling and the utilization of the bran in a more efficient and economic manner than at present, in the rice producing countries is beyond question. However, the numerous constraints and complexities which continue to impede the improved utilization of the bran need to be duly recognized.

(1) Please see references in ~~the~~ Annex on page 9

4. According to the available statistics, the world production of paddy is estimated to be 300 million tons and the rice equivalent would be about 200 million tons per annum. On theoretical considerations the production of bran would be 12 million tons and the theoretical potential of rice-bran oil would be about 2 million tons. The peculiar importance of this subject to the developing countries in Asia is borne out by the fact that more than 80 per cent of the world production of rice is in the ESCAP region. It would seem that concerted efforts are required if the low-cost and low-capacity rice-bran stabilization units are to operate with any degree of success in the conditions prevailing in the rural areas of the developing countries. Notwithstanding the concern for the average capacity rice miller, the technology of rice-bran stabilization having been known and established for a long time, its commercial application or lack of it in large-capacity rice mills would also need to be examined. It is also interesting to observe that given the constraints of the rice milling industry in some Asian countries rice-bran is used for extraction of rice-bran oil whereas in others it has not been found to be feasible and profitable to do so. It would seem that the analysis of these factors would be significant and may contribute to the understanding of the complexity of the problem.

5. If a low-cost and low-capacity rice-bran stabilization unit as is envisaged is developed and adopted on a commercial scale with any degree of success it will undoubtedly improve the economic value of the bran either as a feedstuff or as a raw material for oil extraction. Such a development would be considered as a significant breakthrough in a long-standing problem which has defied many attempts made in the past at great cost of time, energy and money.

6. The current UNIDO research project is of additional interest in view of the impact that it will have in the rural areas once the problem is solved because of the location of the rice mills at the source of production of paddy. This project could be truly conceived as development and application of technology for rural development.

II. TECHNOLOGY

7. The report which will be submitted by the ASRCT will give the literature survey on various technological experimentations that have so far been carried out. It is necessary to take into account the technology of the rice milling units that exists in the developing countries while considering the quality of the rice-bran. In a previous study on rice milling industry (2) it was observed that more than half of the rice crop in Indonesia and about one third in India, was hand-pounded. It was also said to be substantial in Nepal and to a lesser extent in Ceylon (Sri Lanka) and other countries. However, the same study noted that hand-pounding is gradually being replaced by under-productive hullers in many countries. A significant feature is that the rice milling industry in Ceylon (Sri Lanka), Indonesia, the Philippines, India and Nepal uses a large number of hullers with capacities ranging from 250/600 kg/hour. The bran that is produced in hullers is a mixture of husk and bran as there is no device to separate them. Therefore, it is to be concluded that the potential of bran of acceptable quality is far less than what is indicated on theoretical considerations.
8. In another study on rice-bran oil industry (3) the technological aspects of rice-bran oil and more precisely the definition of the rice-bran as distinct from rice husks (hull or chaffs) and rice polishings, with which it is usually mixed up to varying extent, has been adequately dealt with. In a large number of countries what is generally referred to as rice-bran does not really conform to the accepted definition of rice-bran, and therefore the usefulness of the bran either as a feed ingredient or as a raw material for extraction of oil would be extremely limited. Parboiled bran has some unique qualities. The technical explanation for the superior quality of the parboiled bran has been extensively discussed in the report on rice-bran oil industry referred to earlier (3).
9. The available technological information bears evidence to the fact that the problem of rice bran is intimately connected with the rice milling technique that is adopted. Therefore, if an attempt is being made to find a solution for the technical problems of rice-bran such as the development of a suitable stabilization unit, it would stand to reason that the status of the rice milling technology and the feasibility of the

extent of its modernization should be investigated. In other words rice-bran cannot be examined in isolation of the rice milling techniques. These issues have been discussed in extenso in the report on rice-bran oil industry (3). Nearly the same conclusions were also reached by the Interregional Seminar on Industrial Processing of Rice (4) which was convened in 1971 at Madras, India.

III. ECONOMIC AND SOCIAL ASPECTS

10. It may not be quite correct to assume that the bulk of the rice-bran that is produced in the rice mills is not put to proper use. In the report referred to earlier (2) in the Annex, the pattern of utilization of the bran in about ten countries has been indicated. In the report on rice-bran oil industry (3) in the table on page 2, it is shown that less than eight per cent of the potential of rice-bran oil which was calculated on a conservative basis was produced in the nine countries in Asia that were surveyed. However, rice-bran is, by and large, utilized as a feed ingredient, and by no means is a waste material.

11. In some countries where the rice-bran oil industry has made a beginning, apart from the technical problem of the rice-bran, the question of competition from the feed millers becomes an important factor and often times makes it uneconomical to purchase the bran for extraction of oil. A shortage of the substitutable feed ingredients such as oil cakes/meal, fish meal etc. would push up the price of the bran and make it uneconomical for oil extraction. The real difficulty lies in the fact that the better keeping quality of the defatted bran has not yet been fully recognized in some countries. Perhaps in some cases Government regulations also may act as disincentives for the industrial utilization of bran.

12. There is yet another problem which has a bearing on the location of the rice mills. In view of the fact that rice milling is one of the oldest industries in the rice producing developing countries, it is understandable that they are located in rural areas and as observed earlier, are of very low capacity i.e. less than half a ton per hour. Their operations are also discontinuous. Therefore, the quantity of bran that is produced is very small and the collection and transportation to a central extraction plant causes a serious problem. In many cases, it is simply not economical to transport the bran in view of the competing demand for the bran as a feedstuff for the poultry, piggery and livestock in general.

13. The traditional usage of the bran as a feedstuff in the vicinity of its production presents a social problem in diverting its use for oil extraction. This is accentuated by the fact that alternate feedstuffs are not readily available to the farmers at prices which they can afford. Any disturbance in the existing pattern is likely to upset the very livelihood of the people who are dependent on the current utilization pattern of the bran in some areas.

14. Yet another problem of social importance is in the trading of bran itself. It is common knowledge that brokers or commission agents enter the trade in a big way and buy the entire quantity of bran that becomes available directly from the rice mills and deprive it to the local farmers who cannot afford to pay the same price as middlemen or compete with them.

15. In any effort to utilize the bran either as a better feed ingredient or as a raw material for rice-bran oil extraction, the social implications will have to be kept in mind.

16. It is perhaps relevant to recall earlier studies on the disparities in the utilization of rice-bran in some of the developing countries in Asia (5). An analysis of the factors favourable for development of the industry indicates an acute shortage of oils and fats within a country, and a consequent urge to tap all available resources; and also that, to a certain extent, climate and infrastructural facilities act as incentives for its development. Among the eleven countries, only Burma, Japan, India, the Republic of Korea and Thailand can be considered rice-bran oil producing countries. The additional advantages in Burma and Thailand are that the export of rice is the most important source of foreign exchange earning and that, in consequence, comparatively better organized rice milling operation, makes the collection and extraction of bran feasible to some extent, in these two countries.

17. Japan and India continue to increase their production of rice-bran oil, the former both as an edible and industrial oil, and the latter almost exclusively as an industrial oil. The predominant dependence on imports of oils and oilseeds owing to the scarcity of domestic resources in Japan and to the demand for fats and oils outstripping the supply in India, which is seen in a distortion of prices within that country, seems to explain the conditions under which production of rice-bran oil is feasible and profitable.

18. In a number of copra or coconut oil producing and exporting countries such as Ceylon (Sri Lanka), Indonesia, Malaysia and the Philippines, though the interest in the subject is very keen, it is doubtful if rice-bran oil production could be a profitable operation under the prevailing conditions. This has been proved in one of these countries where a solvent extraction plant originally intended for rice bran oil extraction has discontinued this operation and the installed capacity is reported to be utilized for extraction of coconut oil from copra cake. Similar results have been reported on the basis of experimental operations in another country. These facts emphasize the fact that unless the rice-bran oil is competitive in price with the traditional source of oils it is not feasible to extract the oil on an economical scale.

IV. CONCLUSIONS

19. From the information presented in this paper and also available in the previous studies to which reference has been made, the following general conclusions could be drawn:

- (i) The potential of bran availability needs to be re-examined on a realistic basis, taking into account the current milling practices. Theoretical potential calculated on the basis of paddy/rice production could lead to gross errors in judgement and present an unrealistic and imaginary potential of a non-existing source of vegetable oil;
- (ii) The definition of rice-bran should be re-emphasized in the context of development of a rice-bran stabilization unit for adoption on a commercial scale;
- (iii) The technical, economic and social aspects of the rice milling industry as also the administrative and legislative control of the operation of the rice mills in the rice producing countries need to be examined;
- (iv) The findings of the project sub-contracted to ASRCT, Bangkok, should be the basis for continuation of the research, development and engineering aspects of developing a rice-bran stabilization unit which the average rice miller can afford without in any case losing sight of the fact that technology per se does not automatically solve the problem of rice-bran;

- (v) In addition to the project on technology, it is necessary to develop one or more supporting projects on the critical study of the economic and social aspects of the rice milling industry and rice-bran utilization as discussed in this paper;
- (vi) The successful utilization of rice-bran for the extraction of oil in some countries and the lack of it in some other developing countries needs to be specifically examined with a view to laying down the guidelines for future work. In this context, India, Burma, Thailand, the Republic of Korea, and Japan would fall into one group as countries which are deficit in their requirements of oils and fats. On the contrary Indonesia and the Philippines could be taken as truly representative of countries exporting vegetable oils and still rice-bran is a commodity of equal importance to them as in the first group of countries;
- (vii) The co-ordination of research and the development activities on rice-bran in the national institutes or industry in different countries which have an economic interest in the rice milling and rice-bran utilization need to be pursued and the available information disseminated;
- (viii) If a reasonable degree of success is achieved in the research project, demonstration cum pilot plants should be established in partnership with, and co-operation of the national government institutes/agencies or the industry in the developing countries for the promotion and diffusion of the technology found to be feasible for adoption at the rural rice mills.

ANNEX

References

- (1) Research Problems in the Development of Rice-Bran Oil Industry in the ECAFE Region (AIDC/IR/R.5)
- (2) Report of the ECAFE Expert Team in Rice Processing Machinery (AIDC(6)/1) 22 January 1970
- (3) Report of the Expert Study Group on Rice-Bran Oil Industry (AIDC(5)/24) 16 January 1970
- (4) Report on the Interregional Seminar on the Industrial Processing of Rice. (ID/WG.89/24) 19 November 1971
- (5) The Status of Rice-Bran Oil Industry in the ECAFE Region (ID/WG.89/7) dated 4 February 1971

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