1272 92 - 14/33

Potential crops
Review, book, developing countries, arid regions, saline agriculture, salt tolerant plants, food, fuel, fodder, fiber

BOSTID

SALINE AGRICULTURE - SALT-TOLERANT PLANTS FOR DEVELOPING COUNTRIES.

Report of BOSTID, Nat. Res. Council, 2101 Constitution Avenue, NW Washington DC 20148, USA; ISBN 0-309-04189-9, 1990, 135 pp.

This book covers some of the experiences and opportunities in the agricultural use of saline land and water. It aims to create greater awareness of salt tolerant plants, their current and potential uses, and the special needs they may meet in developing countries.
Salts occur naturally in all soils. Rain dissolves these salts, which are then swept through streams and rivers to the sea. Where rainfall is sparse or there is no quick route to the sea, some of this water evaporates and the dissolved salts become more concentrated. In arid areas, this can result in the formation of salt lakes or in brackish groundwater, salinized soil, or salt deposits.
There are three possible domains for the use of salt-tolerant plants in developing countries. These are:
- Farmlands salinized by poor irrigation practices;
- Arid areas that overlie reservoirs of brackish water; and
- Coastal deserts.

Although irrigation can bring arid land into production, this often leads to salinization. In some countries the amount of newly-irrigated land equals the amount of salinized irrigated land going out of production each year. The use of salt tolerant plants may provide a realistic solution to this problem for many developing countries.
Undomesticated salt-tolerant plants usually have poor agronomic qualities such as wide variations in germination and maturation. Salt-tolerant grasses and grains are subject to seed shattering and lodging. The foliage of salt-tolerant plants may not be suitable for fodder because of its high salt content. Nutritional characteristics or even potential toxicities have not been established for many edible salt-tolerant plants. When saline irrigation water is used for crop production, careful control is necessary to avoid salt buildup in the soil and to prevent possible contamination of freshwater aquifers.
Most importantly, salt-tolerant plants should not be cultivated as a substitute for good agricultural practice nor should they be used as a palliative for improper irrigation. They should be introduced only when and where conventional crops cannot be grown. Also, currently productive coastal areas (such as mangrove forests) should be managed and restored, not converted to other uses.

All of these limitations are impediments to the use of conventional methods for culture and harvest of salt-tolerant plants and the estimation of their production economics.
Since few crops have been subjected to selection for salinity tolerance, it is possible that variation in this characteristic may also exist. Conversely, few undomesticated salt-tolerant plants have been examined for variability in their agronomic qualities, and it is even more likely that such characteristics can be improved through breeding programs.
Germplasm collection and classification, breeding and selection, and development of cultural, harvest, and postharvest techniques are all needed. Basic information on the way in which plants adapt to salinity would significantly assist their economic development.
Interdisciplinary communication is particularly important in research on salt-tolerant plants. Cooperation among plant ecologists, plant physiologists, plant breeders, soil scientists, and agricultural engineers could accelerate development of economic crops.
There are four sections in this report. They highlight salt-tolerant plants that may serve as food,fuel, fodder, and other products such as essential oils, pharmaceuticals, and fiber. In each of these sections, plants are described that have potential for productive use. Each section also contains an extensive list of recent papers and other publications that contain additional information on these plants. A list of researchers currently working on these plants or related projects is included at the end of each section.
Although the salt-tolerant plants described in this report typify those that are currently being evaluated or appear to deserve additional attention, the inventory is far from complete. Many other species may have equal or greater potential.
The book is extensively illustrated with black-and-white photographs. It contains much detailed information and tabulated data yet provides an interesting and readable account of the subject.

1273 92 - 14/34

Potential crops
Asia, India, study, field trials, plants, food, indigenous crops

GANGWAR, A.K. and P.S. RAMAKRISHNAN

CULTIVATION AND USE OF LESSER-KNOWN PLANTS OF FOOD VALUE BY TRIBALS IN NORTH-EAST INDIA.

Agriculture, Ecosystems and Environment, 25, 1989, pp. 253-267

The study deals with three important lesser-known crops of food value of one of the tribes, the Khasis, at higher elevations of Meghalaya and 8 species of the Nishis, the Hill Miris and the Sulungs of Arunachal Pradesh in north-east India. This study considers the cropping and yield patterns of these species in the agroecosystem, their nutritive value and the contribution of a nitrogen-fixing legume, towards improved soil fertility.
Of all the 3000 plant species used as food at some time during human civilization, about 150 species are cultivated, of which less than 20 provide over 90% of the food needs. Just about 3 species (wheat, rice and maize) meet over half of the human energy needs. Reliance on such a small number of plants carries great risks, for monocultures are extremely vulnerable to catastrophic failures brought about by diseases or climatic stresses.
In north-east India, under the traditional slash and burn agriculture (locally called jhum), under fallow system (without burning the slash), and under sedentary agriculture, a variety of lesser-known species are cultivated by the farmer. Apart from their food value, many legumes such as *Flemingia vestita* Benth ex Bax. considered here also fix nitrogen in the soil.
One of the two study sites is located at Shilling spread over a distance of 30 km and considering 40 villages of the Khasis. The other study site is at the Lower Subansiri district of Arunachal Pradesh considering 45 villages in all. The extent of cultivation of the lesser-known species by each tribe is based upon sampling done in these villages. Both the study sites receive an annual average rainfall of 200 cm, with about 80% occuring during May-October. Winter is mild and extends from November to February with average maximum and minimum temperatures of 26°C and 18°C, respectively. During other months, the average maximum and minimum temperatures are 34°C and 25°C, respectively.
In this study *Digitaria cruciata* (Nees) A. Camus var. *esculenta* Bor., *Flemingia vestita* Benth ex Bax. and *Perilla ocimoides* L. cultivated by the Khasis at higher elevations of Meghayala, and *Amaranthus virdis* L., *Chenopodium ambrosioides* L., *Coix lacrymajobi* L., *Dioscorea* spp., *Fagopyrum tataricum* Gaertn., *Panicum miliaceum* L., *Perilla ocimoides* and *Setaria italica* (L.) Beauv. cultivated by the Nishis, the Hill Miris and the Sulungs of Arunachal Pradesh in north-east India were evaluated from an ecological and socioeconomical point of view. *Digitaria cruciata* var. *esculenta* is largely cultivated for manure by composting the biomass, although the grains are also consumed. The role of a

lesser-known legume, *F. vestita*, was evaluated for its ability to improve soil nitrogen status. Mixed cropping with *F. vestita* was found to give better economic returns, apart from improved soil fertility with a net gain in nitrogen of up to 250 kg/ha^{-1}year^{-1}.
From the point of view of nutrition many of these lesser-known crops such as *F. vestita* may prove to be superior to traditional ones. *Flemingia vestita* has three times more protein than cassava and twice as much as sweet potato, two of the more widely grown root crops in the tropics. On a world basis, plant sources contribute about 70% and animals about 30% of the human protein needs; amongst the tribals in north-east India considered here this is 60% and 40%, respectively. In many developing countries in the tropics, plant sources could provide up to 90% of the food protein. Despite this and their other uses, as cover crops, green manure, etc. legumes are still minor crops in the existing farming systems of the humid tropics. Possibly techniques can be developed for using edible legumes as inter-crops in rotation with non-legumes so as to reduce significantly the amount of nitrogen fertilizer applied to the non-legumes. With improvement, the lesser-known crops could play an important role not only in the nutrition of the rapidly increasing population but also help in improving soil fertility through appropriate inter-cropping.

1274 92 - 14/35

Potential crops
USA, proceedings, symposium, new crops, policy, politics, international development, regional outlook, crop centers, industrial crops, oilseed crops, fruits, vegetables, landscape plants, aromatics, medicinals, cereals, forages, fiber crops, energy crops, commercialization, research, Purdue University, GTZ

CARLS, J.

CONCLUSIONS OF THE NATIONAL SYMPOSIUM ON NEW CROPS - EXPLORATION, RESEARCH, COMMERCIALIZATION -.

Report of the Second Nat. Symposium on New Crops, Indianapolis, Indiana, USA, 1991, 10 p.; Report prepared for GTZ

This Symposium provided a national forum for leading authorities from industry, government, agricultural experiment stations, and academia to discuss the status and future of new crops development. Lectures and panel discussions provided overviews and detailed analyses on a wide range of new crops, including cereals and pseudocereals, forages and grains, oilseeds, fiber and energy crops, fruits, vegetables, floral and landscape plants, and aromatics and medicinals.
The objectives of the Symposium were to:
- determine the status of new crops research and development nationally and internationally;
- explore the potential of new crops, new uses for existing and underexploited crops, and to identify constraints to commercialization; and
- develop strategies for the establishment of cooperative partnerships between organizations.

The Symposium featured seven technical sessions on the following topics:
- New crops: policy and politics
- International developments in new crops
- North American forecast, including industry outlook, regional development, and provincial and state new crops centers.
- Genetic engineering in oilseed and industrial crops
- Status of new crops research (two concurrent sessions):
  . fruits, vegetables, floral and landscape plants, aromatics and medicinals, and
  . cereals and pseudocereals, forages and grains, oilseeds, fiber and energy crops
- Exploration and new crops
- Industrial crops: routes to commercialization.

New, alternative or underutilized crops were examined which have potential for enhanced production and utilization. Research into these crops may also discover new useful products.
A "new or an alternative crop is either a species new to a region, such as amaranth, adzuki beans, or blueberries, or an existing crop such as millet, buckwheat, or broccoli, which shows increased economic promise".

Plants not only provide food for man and his domestic animals, but also pharmaceutical products and raw materials for industry. Fewer than 20 of more than 13,000 known food plants provide the bulk of man's food needs. Accelerating population growth, ecological hazards and changes in market supply and demand make it necessary for scientists both to maintain a constant search for improved varieties of the major crops and to diversify production by developing locally grown but underutilized crop plants.
Crop diversification is increasingly recognized as important to the American farm economy. However, much of the potential of presently underutilized crops is not realized because of lack of appropriate research and information on the utilization and marketing of plant products.
The following crops are evaluated internationally, grouped into five categories, based on the primary use of each crop:
- grain crops
- oil crops
- pulse crops
- forage crops
- miscellaneous (fiber, energy crops, root crops, medicinal spices)

The development of new crops involves botany, agronomy, forestry, horticulture and market forces to push a potential crop. An interdisciplinary approach is necessary to address the many - faceted problems facing the introduction of a new crop.
In order to speed up this introduction process "New Crop Centers" have been established in the United States.
For example the "Center for Alternative Plant and Animal Products (CAPAP)" was created to aid in the development of new and alternative crop and livestock enterprises. The Center provides at the University of Minnesota focus for generating, receiving and evaluating new product ideas, facilitating alternative product research and development efforts, and disseminating information to the public on alternative plant and animal products.

1275 92 - 14/36

Potential crops
Review, book, developing countries, aquatic weeds, integrated systems, herbivorous animals, soil additives, animal feeds, fiber products, energy, wastewater treatment, food

BOSTID

MAKING AQUATIC WEEDS USEFUL: SOME PERSPECTIVES FOR DEVELOPING COUNTRIES.

Report of BOSTID, Nat. Academy of Sciences, Washington, D.C., 1984, 5th Edition, ISBN 76-53285, 165 p.

This report examines methods for controlling aquatic weeds and using them to best advantage, especially those methods that show promise for less-developed countries. It emphasizes techniques for converting weeds for feed, food, fertilizer, and energy production. It examines, for example, biological control techniques in which herbivorous tropical animals (fish, waterfowl, rodents, and other mammals) convert the troublesome plants directly to meat.
Aquatic weeds have always existed, but in recent decades their effects have been magnified by man's more intensive use of natural water resources.
These plants, among the most prolific on earth, grow luxuriantly in the tropics, weigh hundreds of tons per hectare, and can be a serious hindrance to a nation's development efforts. Eradication of the weeds has proved impossible, and even reasonable control is difficult. Turning these weeds to productive use would be desirable, but only limited research has so far been carried out.
This is a global problem, but it is particularly severe in tropical nations where warm water and increasing numbers of dams and irrigation projects foster aquatic plant growth. Furthermore, the problem is worsened by increasing enrichment of natural waters by fertilizer runoff and by nutrients from human and agricultural wastes.
Aquatic weeds constitute a free crop of great potential value - a highly productive crop that requires no tillage, fertilizer, seed, or cultivation. Aquatic plants have potential for exploitation as animal feed, human food, soil additives, fuel production, and wastewater treatment.
The advantage of weed utilization over chemical and many biological weed controls (e.g., insects and pathogens) is the production of valuable end products: meat, eggs, fish, edible vegetation, fertilizer, animal feed, energy, paper pulp.
The techniques described in this report have been selected for their applicability in less-developed countries, many are also relevant to industrialized countries. Both types of country face a future in which food production will need to depend more and more on the effective management of natural systems, such as waterways.
Each topic is presented in a separate chapter arranged in the following order:

- Description of the technique and of its advantages
- Limitations and special requirements
- Research needs
- Selected readings (significant reviews, general articles)
- Research contacts.

Photographs are provided to give nonspecialist readers who scan the report a sense of its contents; a summary of each chapter is given and, in each chapter, the early paragraphs are nontechnical and discuss the technique and its apparent advantages.
In most chapters the later paragraphs contain more technical information of the kind needed by researchers and technical personnel to decide on the chapter's relevance to their country's specific situation and needs. In this way, it is hoped that the report can introduce decision makers to aquatic weed utilization, while at the same time, providing their technical advisors with the details they need.
This report confines itself to a technical overview, leaving to the reader the task of weighing the technical prescriptions in light of his country's resources and capabilities.
Reading lists and a list of contacts are given so that readers may explore for themselves the relevance and adaptability of the techniques to their specific location.
This report explores an alternative:the conversion of aquatic weeds to food, fertilizer, paper and fiber, and energy.

1276 92 - 14/37

Potential crops
Europe, Hungary, study, field trials, ecological approach, medicinal plants, ecosystems, plant geography, plant phenology, genetic diversity, agrotechnical needs, plant establishment

MATHÉ, A.

AN ECOLOGICAL APPROACH TO MEDICINAL PLANT INTRODUCTION.

Herbs, Spices, and Medicinal Plants, 3, 1992, pp. 175-199

The purpose of this review is to emphasize the ecological aspects related to the introduction and domestication of medicinal plants. Medicinal and aromatic plant introduction began centuries ago and continues today. As the search for new plant-derived products continues, the need for the introduction and cultivation of an increasing number of these species will remain an integral process in the final processing, utilization, and availability. Approximately 50 species have been introduced and are maintained in large-scale cultivation in the temperate zone. The traditional medicinal and aromatic plant-producing appear to be making special efforts to collect and preserve wild plants and to introduce some of the economically significant species into cultivation.
The structure of medicinal plant production, however, has been undergoing substantial change during the past few years. Most apparent is the limitation in the availability of gathered plant drugs, and to some extent, a reassessment of the role of large- versus small-scale production systems. There also appears to be a trend to introduce medicinal and aromatic plants into the less favorable agricultural regions of many countries so as to develop the agricultural base of these areas by providing cash crops or export crops.
Programs such as this type have been established in Italy, Switzerland, and Yugoslavia, and in Czechoslovakia and Poland. In Greece, a country of varied physiographic conditions, 3 centers of aromatic plants have been established with the goal of producing *Ocimum basilicum* L. (basil), *Lavandula* spp. (lavender), *Melissa* spp. (balm), and *Mentha* spp. (mint).
The introduction of medicinal plants to cultivation is also increasing outside of Europe. Bangladesh and Sri Lanka are producing plants of the genera *Rauvolfia* and *Zingiber* (ginger) and others. New Guinea is investigating potential cultivation of *Elettaria cardamomum* L. Maton (cardamom) and *Capsicum frutescens* L. (tabasco), and Indonesia is beginning to produce *Syzgium aromaticum* (L.) Merrill & L.M. Perry (cloves), *Myristica fragrans* Houtt. (nutmeg), and *Curcuma domestica* Val. (turmeric). In South Korea, there are significant increases in the cultivation of *Panax ginseng*, paeonia spp., *Platycodon* spp., and *Angelica* spp. In South Africa, *Artemisia* spp., *Tagetes* spp., and *Eriocephalus* spp. are being cultivated. Cultivation of *Duboisia* spp. from India and of *Heterotheca imloides* from the high mountains of Mexico have been

introduced to central Europe. In North America the cultivation of a wide range of medicinal and aromatic plants is being initiated. Once the basic biological requirements of a species are understood, the agronomist, agricultural engineer, horticulturist, and plant breeder must develop the planting, machinery,and agricultural techniques that will ensure successful plant introduction from both a horticultural and economical aspect. Manageable production procedures involve plant selection and breeding, propagation, cropping systems, pest control, harvest and postharvest handling, and processing. The developing and testing of productive systems of introduced medicinal crops require the growing of the plants under environmental conditions that will simulate the field ecology. Generally, plants are first grown in small field plots and/or within the controlled environments of greenhouses or climatic chambers to establish ecological models. Production is increased as various cultivated systems prove successful in promoting economically viable crop growth, development, and product synthesis.
The introduction of medicinal plants into cultivation will probably remain a high priority and play an increasingly significant role in the quest for homogeneous, high-quality natural plant products for use in the preparation of medicines.

1277 92 - 14/38

Potential crops
Review, crops, humid tropics, arid regions, nuts, cashew, macadamia, kola nut, dika nut, njansan, mongongo nut, ye-eb

SPORE

NUTS: MULTI-PURPOSE AND PROFITABLE

SPORE, 36, 1992, p.5

Most nuts are highly nutritious and some have a high sale value. Cashew and macadamia are much in demand for export while other kinds of nuts are produced more locally and may be unknown outside a particular region. Some of these also have the potential to become useful, productive and profitable crops elsewhere.
Typically, most nut species are moderate to large trees suitable for planting singly in gardens, hedgerows, orchards or as part of agroforestry. As well as cropping, they provide shade and stabilize the soil. Some have very deep roots and remain productive under surprisingly arid conditions.
The cashew (*Anacardium occidentale*) is the most widely grown nut, excepting coconut and oilpalm which are in a different crop category. It originated in the American tropics from Mexico to Brazil, but has long since spread successfully to many lowland tropical areas in Africa and Asia. The largest African producers of cashews are Mozambique and Tanzania with smaller amounts being produced in Kenya, Madagascar, Malawi, Nigeria and Senegal. But there is much greater potential for this crop. The nuts have a high export value, while the cashew apple can be consumed fresh or dried. The shell of the nut yields phenol-containing oils which are used for preserving, waterproofing and, after distillation, for brake-linings, inks and cements.
The cashew grows on relatively dry and infertile soils but requires high temperatures and no rainfall during flowering and harvesting in order to produce optimum yields. Since harvesting is by hand, plentiful, inexpensive labour is essential. This is true of most nuts and fruits and may be seen as advantageous since harvesting provides an income opportunity in rural areas. Processing is necessary to remove the cashew shell nut liquid which can blister human skin. In the past, East African output was shipped to India for processing but now processing plants are being built in Kenya, Mozambique and Tanzania.
The macadamia (*Macadamia integrifolia*) is a more recent arrival in Africa, having originated in Australia. Macadamias require a frost-free sub-tropical climate with at least 125 cm of well-distributed rainfall per year. They will grow on a wide variety of soils if drainage is adequate. However, wind is a hazard: the wood is brittle, and where there are strong winds plantations must be protected by windbreaks.
The kola nut (*Cola nitida*), dika nut (*Irvingia gabonensis*) and njansan (*Ricinodendron africanum*) all grow in wet forest regions but the kola is the most widely grown; it is widely traded as a

bitter chewing stimulant. The kola is still mainly harvested from forests but is increasingly planted in orchards, in cocoa plantations and among coffee. The tree is slow growing and only comes into full production in about the twentieth year.
The dika nut matures in seven years and although exploitation is still limited to self-planted trees the dika seems suitable for planting in hedges, wooded areas, mixed orchards and pure groves. The fruit looks like a small mango and can be eaten in the same way but it is the kernels that are most esteemed: when heated they yield a thick oil. The kernels are also ground to make a paste for thickening stews in the same way as the groundnut and njansan. Njansans are tall trees producing fruits with kernels that have several culinary uses. They can be eaten grilled or ground into a paste and oil can be extracted from the kernels. Most exploitation is from the wild but trees are now being planted deliberately in some regions.
The mongongo nut (*Ricinodendron rauteanenii*) from the Kalahari and the ye-eb (*Codeauxin edulis*) from Somalia are staples of local diet in very arid regions and the practicality of these species being planted as desert orchards in their countries of origin and elsewhere is being investigated. Germination and seedling health remain problematic.
An arid land species which is much more widely exploited, although again there have been difficulties, domesticating it as orchard plantings, is the shea butter tree (*Butyrospermum parkii*). The shea nut is used throughout the Sahel for food and as a raw material for cosmetics and medicines. It has considerable economic potential.
At a time when tree planting is being promoted widely in most parts of the tropics there is ample evidence to suggest that one or more species of nuts may be suitable candidates for selection. Perennial species require little cultural attention and most nut species appear to thrive on poor soils with a little or no demand for agrochemical inputs. They deserve more attention than they have received in the past.

1278 92 - 14/39

Potential crops
Review, Africa, Asia, Latin America, drumstick tree, horseradish, spinach tree, multipurpose tree, food, seed oil, cosmetic industry, water purification, project, GTZ

JAHN, S.A

MORINGA OLEIFERA **FOR FOOD AND WATER PURIFICATION - SELECTION OF CLONES AND GROWING OF ANNUAL SHORT-STEM.**

entwicklung +ländlicher raum 23, 4, 1989, pp. 22-25

This paper attempts to provide a rough evaluation of *Moringa oleifera* germ plasm as well as an assessment of fruit yields of traditionally cultivated trees in various tropical developing countries and aims to indicate possible methods of selection and plant breeding to improve the production of high-quality Moringa fruits. The study is based on recent field observations and water treatment tests within the framework of the supra-regional water purification project with natural coagulants sponsored by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH and on the evaluation of Moringa seed samples generously supplied by colleagues in Togo, Aruba, the Dominican Republic and the Indonesian islands Flores and Timor.
Moringa is grown throughout the tropics, most notably in the Philippines, Haiti and Hawaii. In Africa it is grown along the Nile, in Sudan and in Uganda, Zaire, Cote d'Ivoire and several other countries. According to the ICRAF database, the tree grows well in the following conditions:
Mean annual rainfall: 366-1177(!). Annual mean minimum temperature: 18-20°C. Annual mean maximum temperature: 31-34°C. Absolute minimum temperature:6-8°C. Altitude: 0-660 m.
Moringa also grows at higher altitudes, as a specimen tree has grown for many years in the Harare Botanical Garden (1470 m). Echo reports that it grows in Nepal. In the Dominican Republic, it is said to withstand frost and even frozen soil.
Moringa likes light sandy and medium loamy soils with a minimum depth of 50 cm and no water-logging. It will stand some acidity.
The tree can be propagated in several ways. It will grow from stumps, seedlings, natural regeneration, coppicing, air layering, direct sowing and cuttings.
Moringa can be used in a multitude of ways. Its main deficiency compared with many leguminous trees is that it does not fix nitrogen. As it is deep-rooting, it could also be tried in alley cropping.
Moringa oleifera (horseradish or drumstick tree) is a multipurpose tree which can be propagated easily from seeds and cuttings. The tree has been introduced to most countries in the tropical belt. The quality and quantity of seeds which can be obtained from traditionally grown trees varies enormously however both in India, the country of origin and in the other countries. Unfortunately the cultivation has been neglected to a great extent and the fact

that the tree has still survived in many places is only due to its admirable resistance and hardiness.
An increasing interest in the quality and yield of the fruits of the *Moringa oleifera* (horseradish, drumstick tree, spinach tree) is at present shared by scientists and organisations concerned with improved nutrition, hunger-aid and water supplies in rural areas of tropical countries. Although young pods are edible whole, it seems that there are even more delicious dishes which can be prepared from green Moringa "peas" either removed from the pod when served or cooked like pulses.
In the past, the seed oil known under the trade name "ben oil" was also used for cooking, but now it is principally utilized in small amounts in the cosmetic industry to fix volatile odorous substances.
Moringa seeds, however, also contain polypeptides acting as primary coagulants which can turn turbid and contaminated surface waters into clear, and safe drinking water. For all these uses large healthy unripe or mature seeds and a high annual yield are essential.
For a peasant farmer to grow 20-30 Moringa trees on his own initiative around his compound must mean that the tree has considerable potential. Much research is needed to find out how its obvious qualities can be used more widely. Farmers could gradually extend tree cultivation, starting with a few around the house and then expanding to a plot for feeding livestock in dry periods, and later planting it all over the farm along contours to prevent erosion or for alley cropping between annual crops.

1. GEOGRAPHICAL INDEX

2. SUBJECT INDEX

3. AUTHOR INDEX

This is the fifth edition called "Abstracts on Sustainable Agriculture". In view of the good experience made with the "Abstracts on Intercropping", GTZ continued making the documentation available. Intercropping remains an important aspect of the abstracts but will now be treated as an integral component of sustainable agriculture.
These abstracts are more comprehensive than the usual type of annotated bibliography but they cannot substitute the original publication. For details it is advisable to refer to the original.
The abstracts are divided into different sections, e.g. integrated systems, agroecology, homegardens, soil fertility, water management etc. The subject index, based on key-words, the geographical indices as well as the index of authors help the reader to find abstracts on specific aspects of sustainable agriculture easily.

Deutsches Zentrum für Entwicklungstechnologien

ISBN 3-528-02075-X