Food for Thought

Preservatives — The

Science and Technology

Rice-fish Farming Makes a Comeback in Asian Countries

HE traditional practice of rice-fish farming, or the raising of fish in rice paddies, is making a comeback in Asian countries. Throughout the world, the technology is being revived through an integrated programme that aims to boost farm production and prolits.

Two international research groups - the International Centre for Living Aquatic Resources Management (ICLARM)

and the International Rice Research Institute (IRRI) have collaborated in the creation of the IRRI-ICLARM Rice-Fish Farming Systems Research Project, which is funded by the Asian Development Bank (ADB). The project aims to make the technology work through researches on the fish component, requirements of the rice crop, and farmers' attitude toward ricefish farming.

based in the Philippines, are just two of 18 centres worldwide supported by the Consultative Group on Interna tional Agricultural Research (CGIAR). Many other research institutions and donor agencies are recognizing the importance of rice-fish farming. A number of important research activities on the technology are going on in farm fields and research stations.

and KDML 105. Dr P K Mukhopadhyay has been conducting studies in West Bengal, India on deepwater-rice-fish culture. Encouraging results have been found when rohu (Labeo rohits), mrigal (Cirrhinus mrigala). Java carp (Puntius javan-

oration with the Sakon Nakhon

Rice Experiment Station in

northeast Thailand, is examin-

ing the effect of a polyculture

of common crop (Cyprinus

carpio). Nile tilapia (Oreoc-

hromis niloticus), and silver

carp (Puntius gonionotus)

stocked at 5,000 fish per

hectare and on the yields of

the rice varieties RD6. RD15.

According to Greg Chapman, a Canadian who worked on the project in Thailand "fish take useless things and turn them into protein". He notes that fish eat algae, rice pollen, weeds and insects while also fertilizing the soil more effectively than comm ercial products. Fish likewise reduce pests by eating leafhoppers, stem borers and aphids, and lower the incidence of several rice diseases. In addition, rice-fish farming creates a reliable source of protein for the farmers, offset ting the decreased availability

of wild fish in many countries. In the West Java Project in-

The 2,000-year-old technique was abandoned by many countries when the 'green revolution' was introduced

icus) and common carp are grown under these circumstances. "Asian farming is ricebased, and has the potential to produce large quantities of high-value fish on irrigated land," says an ICLARM official.

The technique of rice-fish farming has been practised in Asia for more than 2,000 years but was abandoned by many countries when the "green revolution" was introduced. The new method puts emphasis on high-yielding, monoculture rice varieties that require the use of pesticides and fertilizers, and double and triplecropping of rice. Although productive, these practices reduce soil fertility and are expensive for farmers to maintain, some officials of the Canada-based IDRC pointed

Rice-fish culture can actually increase the yields of rice up to 25 to 30 per cent while providing farmers with extra income. According to an IDRC official, this is important in some areas such as northeast ern Thailand, where the farmers are marginalized, cultivate under difficult conditions and find the cost of pesticides and fertilizers financially burdensome. A study conducted by CARE-Bangladesh in Rangpur showed that in 1991, some 63 per cent of project area farmers who used pesticides in their rice fields completely stopped using pesticides after. trying rice-fish farming.

Indonesia, the introduction of ducks enhanced the rice fish ecosystem. They eat crabs and insects and their droppings act as a nutritive addition.

Fish species also most adaptable to rice fields in Asia are Java tilapia (0. javanicus). snakeskin gourami (Trichogastar pectoralis), walking cat fish (Clarias spp.), snakehead (Channa spp.), seabass (Lates calcarifer), grass carp (Ctenopharyngodon idella), and crucian carp (Carassius spp.).

Rich-fish culture is also being undertaken in other coun-

tries in Bangladesh, experi ments at the Bangladesh Agricultural University in Mymensingh indicate that rice yields are enhanced by over 10 per cent when fish are introduced into the system. In China, a great variety of projects have been undertaken to resolve conflicts between rice and fish culture methods and to increase the overall efficiency of the entire system. In Indonesia, the government has decreed a programme of ricefish culture intensification since 1988 through which farmers can obtain credit for buying fingerlings and other production inputs, and can also avail of training and extension services. In Malaysia, ricefish farming is practised exclusively in the irrigated Krian area of North Perak. It is in the form of a captural fishery of wild fish trapped, grown, and later harvested from rice fields at the end of the season. In South Korea, rice-fish culture is being tried. Low tempera tures and a short growing sea son are reported to be the constraints of the system In Viet Nam, experts report that rice-fish cultivation has great potential for future extension.

Meanwhile, the traditional Chinese farming practice of pig and fish raising within the rice field is now spreading in Southeast Asia. Aside from supplementing income and improving nutrition, rice-pigfish culture maximizes land use by integrating three farm enterprises. - Depthnews Asia

Bush and asked to point in the

direction of known locations of

between 7 and 200 kilometres

away. The sites chosen were in

a very rugged area, allowing no

direct path from A to B. Among

the 120 test subjects, the av-

erage deviation from the direc

tion of the location amounted

on the compass. (A smaller

control group of Dutch people

recorded an average deviation

of 90°). It is still not clear how

the men from the Hopevale

tribe were able to orientate

themselves so exactly. Despite

having many reference points

in their own surroundings.

they can orientate themselves

easily even outside the familiar

environment — for example, in

windowless buildings or while

travelling at night in an illumi-

tional theory in cognitive psy

chology", states Stephen

Levinson. Previously most psy-

chologists had assumed that

the system of orientation was

the same among all people - a

notion with a long tradition

Indeed, the philosopher Im-

manuel Kant regarded the di-

vision into left and right as one

tial thought, common to all

peoples throughout the world.

However, the Nijmegen re-

searchers are now advocating a

different approach. "We cannot

simply transfer the research

findings from our own culture

to people of other cultures"

warns Stephen Levinson

of the basic elements for spa-

"Our findings refute conven-

nated bus.

to less than 4 per cent, or 13



Chemicals We Consume

by Saqib Hussain Shirazi

OOD is one of the primary needs of life. In ancient times, men lived from hand to mouth, and did not realize any need for preserving their food. But as time passed, civilization developed and men discovered various processes for the preservation of foods. Food preservation is required because in normal environmental conditions large quantities of food become spoiled. When foods spoil, they undergo physical and chemical changes that may render the food inedible or hazardous. Two chief causes of food spoilage are the growth of microorganisms (particularly, bacteria, moulds, yeasts) and the action of enzymes that occur normally in the food. Thus, preservation of food is based on retarding the growth of spoiling organisms in food, and also controlling

enzymatic actions in food. Methods of food preservation are of two general classes: (1) Bactericidal or sterilizing methods, involving heating, canning and radiation Bacteriostatic, which includes drying, treating at low temperature, using various chemicals etc. No method of food preservation however will improve the original quality of the food product.

Commercially, chemical preservatives are used to preserve food for long periods at a ime. Those food additives which are especially added to prevent deterioration and decomposition of food are called chemical preservatives. The inhibition of the growth and activity of microbes is one of the main purposes of the use of chemical preservatives. A chemical preservative should have a wide range of antimicrobial activity, should benontoxic to human beings. should be economical, should not be inactivated by the food or any substance in the food. should not encourage the development of resistant strains. should not have any effect on the flavor, taste, or aroma of the original food and should kill rather than inhibit microbes. Chemical preservatives are used either independently or in combination, with other forms of preservation, to maintain a food in its original or fabricated state and to prevent excess losses from deterioration. Moreover, those additives which are added have maximum levels of concentration which can be permitted in

Critic acid is used in syrups. drinks, jams and jellies as a substitute for fruit flavors and for preservation. Lactic and acetic acids are added to brines of various kinds, green olives etc. Sorbic and propionic acids

are used for inhibiting mould growth in bread. The effectiveness of these acids is mainly dependent on the toxic action of the acid or salt. The higher the salinity and the stronger the acid, the more effective are these organic

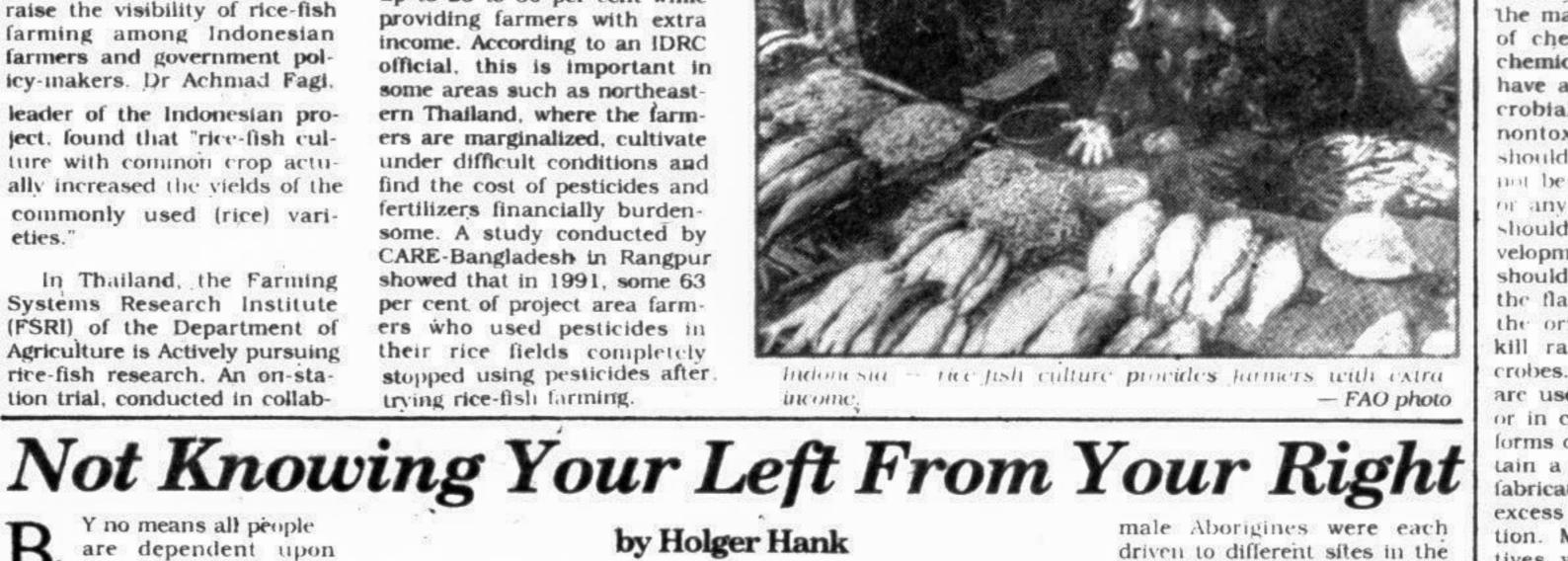
preservatives. Benzoates (salts of benzoic acid) are used in jams, jellies, margarine, pickles, fruit juice etc. Sodium benzoates are only effective when used in acidic solution. Acetic acid in the form of vinegar (vinegar is actually 6-10% acetic acid solution) is used is a preservative in pickles.

Sodium nitrate, or nitrite, or mixtures of these, are commonly added to sodium chloride in mixtures for curing meat. The nitrite has two main functions: to preserve the pleasing red color of the meat by reacting with food components in the meat, and to prevent the germination and growth of any botulism endospores that might be present (botulism is a kind of food poisoning caused by anaerobic bacteria, clostridium bo-

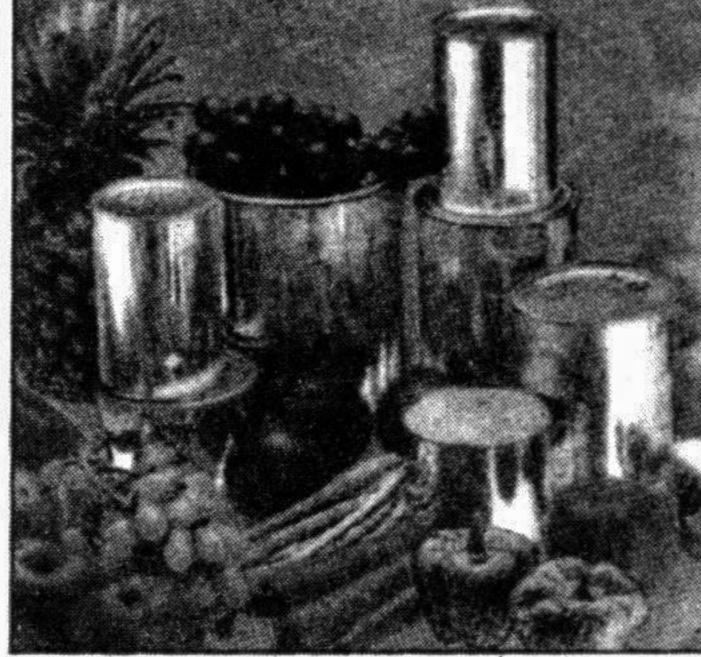
The Egyptians and Romans burned sulphur to form sulphurdioxide as a means of sanitizing their wine making equipment and storage vessels. Today sulphurdioxide and sulphites are used in the wine industry to sanitize equipment and to reduce the normal flora (microogranisms that colonize an animal or a plant without causing disease are called normal flora) of the grape. Sulphurdioxide is applied as a gas to treat drying fruits. Sulphurdioxide suppresses

growth of yeasts and molds. Sugars, such as glucose or sucrose, owe their effective ness as preservatives to their ability to make water unavailable to organisms. In sweetened condensed milk, jellies, candies, fruit syrups, high concentrations of sugar are applied which function both asia sweetening elements and as preservatives.

Different spices vary in their effectiveness, depending on the source, the freshness. and whether they have been stored whole or ground up. Cinnamon and cloves, containing cinnamic aldehyde and eugenol, respectively, usually are more bacteriostatic than



From a general point of view, preservatives can be grouped into two categories:



(1) Those added preservatives not defined as such by law: natural organic acids (lactic, malic, citric etc) and their salts, vinegars, sodium chloride, sugars, spices and

(2) Substances generally recognized as safe (GRAS) for addition to foods: propionic acid and sorbic acid and their salts, benzoic acid and its salt, sulphurdioxide, nitrites etc.

The actions of these chemicals in food are described be-

the Indian Journal of Medical

Research, scientist D S

Hebbalkar and coworkers said

the oily liquid obtained after

steam distillation of the leaves

could keep away mosquitoes

Tests on various fractions

for half an hour to an hour.

are other spices. Wood smoke contains a

pounds that may have bacteriostatic and bactericidal effect. Formaldehyde which is effective against molds, bacteria oils, wood smoke, nitrogen. and viruses is considered the most effective of these com pounds. Phenols and cresols are also generated from wood

> Among the chemical preservatives only sodium nitrates are carcinogenic. Reaction of nitrites with aminoacids forms nitramines

which are carcinogens.

large number of volatile com-

tioned chemicals, certain antibiotics have been tested on fish, meats, poultry, in an endeavour to lengthen the storage time at chilling temperature. The FDA (Food and Drug Administration of USA) have approved tetracyclines at 5ppm (parts per million) only on fish and unpeeled shrimp.

Besides the above men

It is vital to mention the name of the preservative, and its concentration, used in food during marketing of the product. But there are too many industries in our country which are marketing various kinds of jams, jellies, pickles, fruit juices without mentioning the name and concentration of preservatives used Shouldn't the authorities pay attention to this matter? We should be aware of what goes into our bodies through the food we

consume

SALIVA THAT BLOCKS AIDS VIRUS by Jim Fuller CIENTISTS have idenbinding to the white cells. tified a protein in However, it was found that the human saliva that protein does not react with blocks the AIDS virus from in-CD4, the molecule on the sur-

Aquaeulture research in India.

SCIENTISTS IDENTIFY PROTEIN IN

virus a foothold leading to in-Researchers of the US Nafection. tional Institute of Dental Re-"The ability of SLPI to block search (NIDR) told and AIDS HIV infectivity by reacting with meeting that a small protein in a molecule other than CD4 is a saliva called secretory leukosignificant finding." McNeely · cyte protease inhibitor, or said. The next step is to iden-SLPI, provides protection by tify the SLPI receptor and debinding to the surface of white termine the role it plays in

feeting critical immune system

cells that are the targets of the

blood cells. These cells are

also known as T-helper cells

because they help orchestrate

the body's immune response to

help to explain why AIDS does

not appear to be spread by

saliva. In fact, concentrations

of the human immunodefi-

ciency virus (tilV) that causes

All)S are very low even in the

were presented at the Confer-

ence on Human Retroviruses

and Related Infections being

held from January 29 through

time that AIDS does not ap-

pear to be transmitted readily

through kissing or oral sex.

and scientists have been

searching for the components

in saliva that prevent HIV in-

many years that the spread of

HIV through saliva is not ex-

tensive," said Dr Tessie Mc-

Neely, a researcher at NIDR.

"That's why we were prompted

to look for the physiological

it was known that saliva con-

tains molecules that help clear

microbes from the mouth.

even when these molecules

were removed saliva's protec-

tive effect against AIDS con-

tinued. Now a team led by Mc-

Neely and researcher Sharon

Wahl, also of NIDR, have iden-

tified the factor that may play a

key role in providing that pro-

In a series of test tube ex-

periments, the research team

tested a battery of salivary pro-

teins to see which ones pro-

tected white blood cells from

HIV infection. They found that

only SLPI provided substantial

protection at levels normally

showed that SLPI works by

Further experiments

Researchers said that while

"It has been known for

February 2 in Washington.

Results of the latest study

It has been known for some

saliva of AIDS patients.

The latest findings may

infection.

fection.

reason for that.

tection.

found in saliva.

HIV entry into host cells." McNeely said it may be possible eventually to inject SLPI directly into the blood stream to keep the virus from attacking blood cells. SLPI already circulates in the blood, but it

face of white cells that at

taches to HIV and gives the

extremely low levels. But researchers caution that just how SLPI protects against infection remains a mystery. The protein, which is found in the coating of most mucous membranes, is believed to be a natural protector against the body's own protein-destroying

enzymes. But the extent of the protein's activity against HIV in fluids other than saliva, as well as its potential as a protective agent against the transmission of HIV. has yet to be deter-

In another development, a

research team from the National institute of Allergy and Infectious Diseases told the conference that they have come up with a novel strategy for a safe AIDS vaccine. They said the vaccine would consist of a live but weakened AIDS virus that can be killed off once it has primed the body's immune system to mount a re-

action to the infection. The team has created form of the AIDS virus that carries and extra gene taken from the herpes virus. Because of this gene, cells that become infected with the virus can be selectively destroyed with ganciclovir, a widely available herpes medicine.

"We attempted to improve the safety of an HIV vaccine using a suicide gene," said Dr Stephen Smith, a researcher at the institute.

He added that while the approach looks promising in the test tube, much more testing, including extensive use in monkeys, will be necessary before it can be tried on people. He said human studies are at least three years away. — USIA

The Sukamandi Research Institute for Food Crops and the Indonesian Research Institute for Freshwater Fisheries are also collaborating in a project sponsored by the International Development Research Centre (IDRC) to raise the visibility of rice-fish farming among Indonesian farmers and government policy-makers. Dr Achmad Fagi, leader of the Indonesian project, found that "rice-fish culture with common crop actu-

in Thailand, the Farming Systems Research Institute (FSRI) of the Department of Agriculture is Actively pursuing rice-fish research. An on-station trial, conducted in collab-

Y no means all people

in the same way.

sions as "off to the right" or

around to the left", reports

Stephen Levinson, the director

of the research group for cog-

nitive anthropology. Since

1990, he and his colleague

Penelope Brown have been

travelling to this remote

mountain region twice a year

to study the approximately

15,000 Indians living there.

From their investigations, the

Max Planck researchers have

established that the Tenejapas'

vocabulary not only lacks sev-

eral words important for Eu-

ropeans but also that the Indi-

ans think within the structures

established by their language.

Experiments have shown, for

example, that the Tenejapas

don't note the difference be-

tween a picture and its mirror-

image. Penelope Brown: "Only

when it was expressly pointed

In accounting for this ob-

servation. Levinson theorises

that "the Tenejapas see the

world from a non-egocentric

perspective". Only by placing

ourselves at the centre of the

out to them did the test sub-

jects notice the change".

ally increased the yields of the

commonly used (rice) vari-

by Holger Hank

are dependent upon the directional indicaworld before us can we divide tors left and right for orientation. Researchers from the Max Planck Institute for Psycholinguistics in the Dutch town of Nilmegen have discovered, for example, that the Tenejapa Indians from the southern Mexican state of Chiapas can get around easily without these directions These findings will necessitate a revision of current theory. according to which all people orientate themselves in space namely "We noticed that the Tenejapas do not use such expres-

the world into a left half and a right half. According to Levinson, the Indians possess a type of in-built compass which enables them to orientate themselves on an absolute, immutable system of reference. "This would be comparable to our knowing instinctively where North, South, East and West are." Instead of the four principle directions, however, the Tenejapas use only three; "upwards" "downwards" and "across" -which they derive from the steep inclines of the terrain in which they live. For example, "the man is standing to the right of the tree", translates into the Tenejapas tongue as :

sides arbitrarily. The Tenejapas are not unique in this regard: The researchers have now traced six communities which orientate themselves on a system of fixed reference points in a way similar to the Mexican Indians Others have been found in Australia, India, Papua New Guinea and in Nepal. Levinson estimates that, worldwide, a third of the remaining small and highly traditional communities possess a totally different spa-

right". From their perspective

the hot-water tap could change

Their points of reference are not always derived from the surrounding landscape.

Europe or North America.

tial perception to the people of

Researchers Discover People with Unusual Spatial Orientation. Landscape, Sun and Wind Direction Serve as Reference Systems.

The man is standing upwards of the tree".

Although the first roads and

power lines have now penetrated through to this remote mountain region of southern Mexico, the Tenejapas still encounter difficulties outside their familiar surroundings. "From their viewpoint, we live in totally distorted world", explains Levinson. He relates the example of a married couple on their first visit to a Mexican city: "Both Tenajapas were particularly confused by the water taps in their hotels as

they were unable to compre-

hend the arrangement of hav-

ing the cold-water tap on the

left and hot-water tap on the

Some cultures orientate them selves by the sun or the prevailing wind directions, and such fixed systems of reference make great demands on the memory and imagination of the people. For example, John Haviland from the Max Planck institute observed that the Hopevale Aborigines of northern Australia use hand signals conspicuously often when giving someone directions. Tests have demonstrated that the Aborigines' positional sense has become so highly devel oped that they are able to point accurately in the same direction over distances of hundreds of kilometres.

People are much more diverse than most scientists have been prepared to believe." In a further experiment, 10

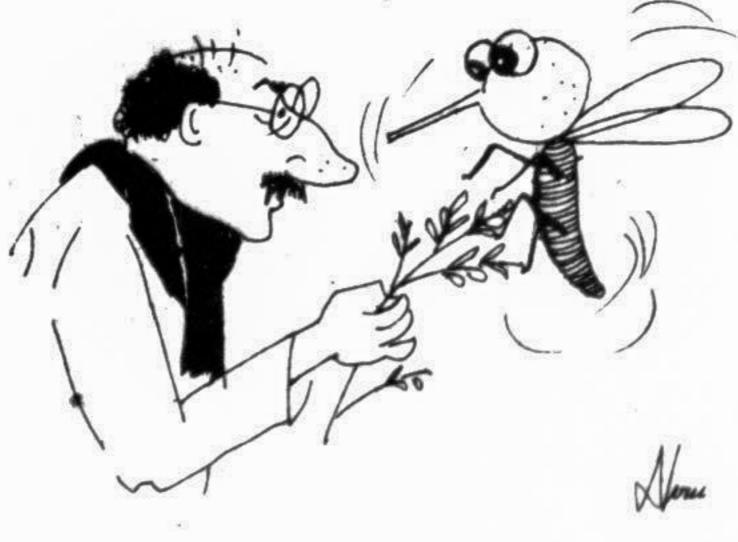
Mosquito Repellents from Plant Oils

repellent .

have earlier been reported to be effective against rheumatic smoke from the burning leaves

Other beneficial properties insecticidal activity against household pests, mosquito larvae and house flies.

A chance observation by scientists from the National Chemical Laboratory (NCL). Pune, that the tribals in the jungles of Khandala in



Maharashtra use the smoke of the leaves of Vitex negundo at night to protect themselves from mosquito bites, led the NCL researchers to examine the scientific validity of the

The scientists systematically evaluated the volatile oils from the leaves of Vitex for mosquito repellent activity, on the basis of protection period offered against mosquito bites.

During experiments, a human had covered with a snugly fitting polythene bag was introduced in a cage containing 1000-1500 hungry mosquitoes. The mosquitoes were allowed to bite on the back of the hand through a mushin cloth screen stack over a hole cut in the polythene bag.

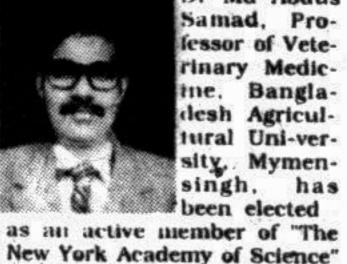
Reporting their findings in

obtained after subjecting the oily liquid to alumina column chromatography showed that the mosquito repellent activity was confined to a fraction extracted with a mixture of benzene and chloroform mixture and another extracted

with chloroform The researchers have concluded that their study provides scientific support to the tribal practice of using V negundo leaves to repel mosquitoes

PTI Science Service

Bangladeshi Scientist Honoured Dr Md Abdus 1989. He worked on toxo-



lessor of Veterinary Medic-Bangladesh Agriculural Uni-versity. Mymensingh, has

New York Academy of Science" in recognition of his researchwork on biomedical science and technology.

The Royal Society, London, awarded him fellowship to work on molecular research on toxoplasmosis at the Moredun Research institute (MRI). Edinburgh, UK. Dr Samad has recently returned form the UK after successful completion of schedule-research on polymer chain reactions (PCR).

The Commonwealth Commission, London, also awarded him a Commonwealth Academic Staff Fellowship in

plasmosis under this programme with Professor M J Charleson at the University of Liverpool, England, He obtained his Ph.D from the Haryana Agricultural University (HAU), India, in 1982 and the HAU awarded him a certificate of Merit with Prize for an outstanding Transcript Academic Record in his Ph.D programme. He has more than 70 research publications in national and international journals and two professional books in the Bengali language to his credit.

In addition to his academic duties, he works as a Principal Investigator of a collaborative research project on toxoplasmosis, funded by the Bangladesh Medical Research Council, with Dr Sayeba Akhtar, Professor of Obstetrics and Gynecology, Mymensingh

Medical College.

A common aromatic shrub called "nirgundi" in Ayurveda and Vitex negundo by botanists has been found to contain an oil in its leaves which may be an excellent mosquito Leaf extracts of this shrub

swellings of the joints, as a tonic and vermifuge, while the is used to relieve headaches. attributed to the plant include