# AGRICULTURAL DIVERSIFICATION AS A TOOL OF TOBACCO CONTROL

**Dr.P.R.Panchamukhi**
**Director**
**C.M.D.R**

**Paper for presentation in the WHO International Conference on Global Tobacco Control Law : Towards a WHO Framework Convention on Tobacco Control**

**7-9 January 2000**
**New Delhi**

**Centre for Multi-disciplinary Development Research**
D.B.Rodda Road, Jubilee Circle
Dharwad – 580 001.
Karnataka State, INDIA.

# AGRICULTURAL DIVERSIFICATION AS A TOOL FOR TOBACCO CONTROL

## Executive Summary

Tobacco is a killer plant. Unfortunately humankind has spent so much of the scarce resources for the promotion of this killer plant. The main objective of the present paper is to examine whether supply-side measures can be effective in controlling the tobacco menace, and if so, which measures are needed. Classical economists believed in the philosophy that ***supply creates its own demand***. In this background the ***control of supply should control its own demand.*** The paper believes that supply side measures can be only long term measures to eradicate the tobacco epidemic. It also believes that demand side measures can get strength if they are supplemented by supply side measures.

***The focus of the paper is on the initial stage of supply side, viz., tobacco cultivation.***

**2. How much of land area is devoted to growing this killer plant ?**

Nearly five million hectares of world's land is devoted to cultivating this plant. Facts and figures show that the world area under tobacco is expanding and that sustained decline in the tobacco area is not within sight in all the countries. It is shocking that area under the killer plant is expanding in developing countries though they are under the grip of poverty, hunger and unemployment. Such disturbing trends are brought out from the following charts.

Chart-1

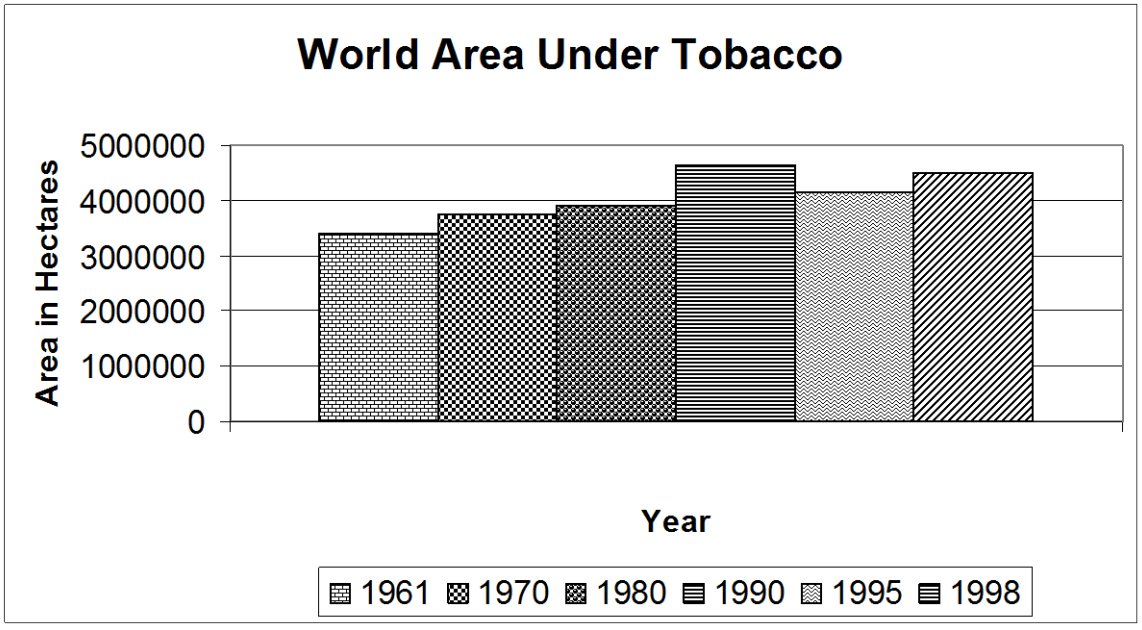
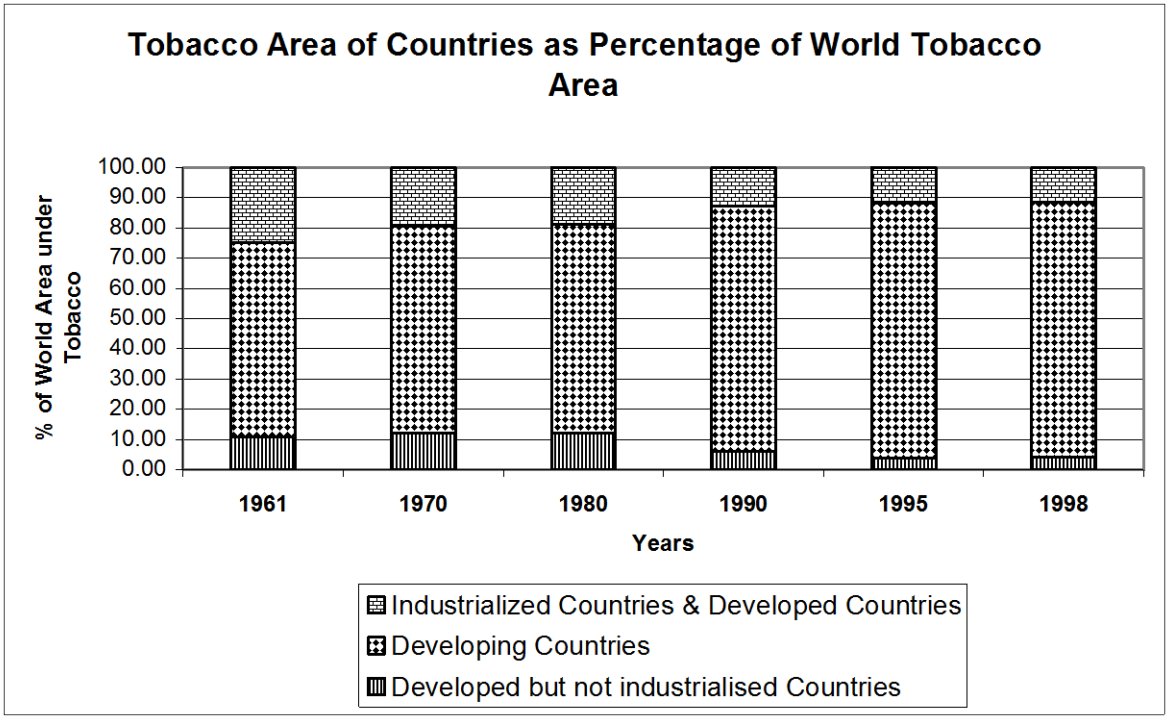


Chart-2




Tobacco yield (production per hectare) is highest in developed and industrialized countries. Yield is increasing in all categories of countries and also in the world. This is shown in the following chart.

Chart-3a

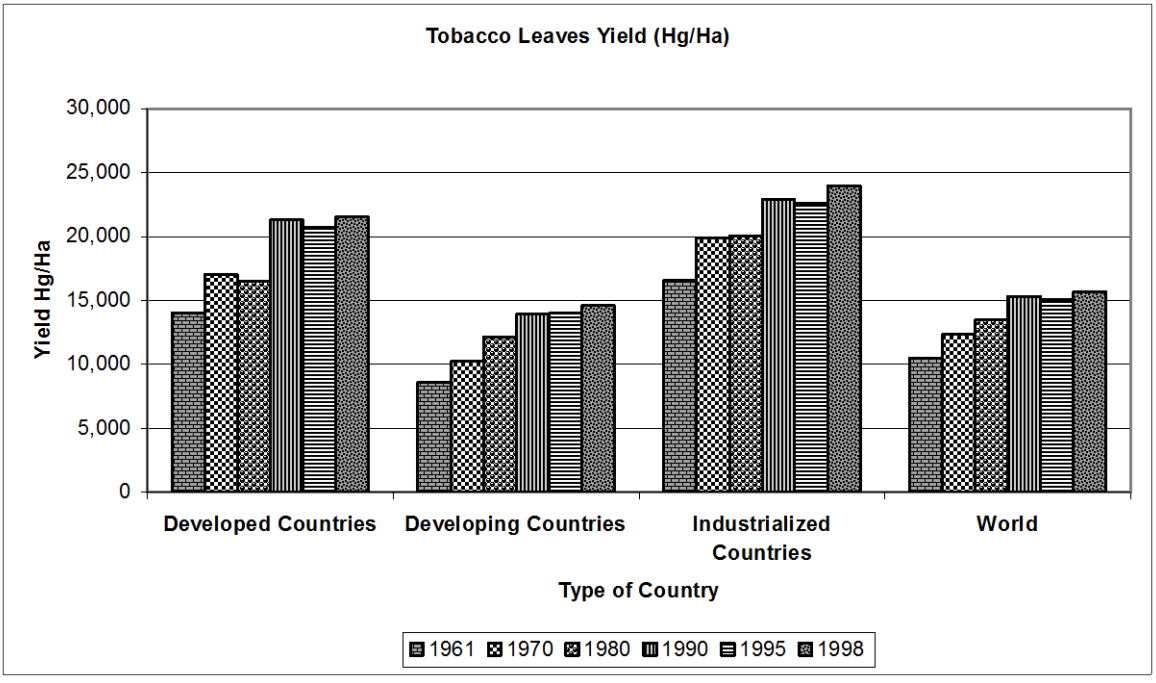
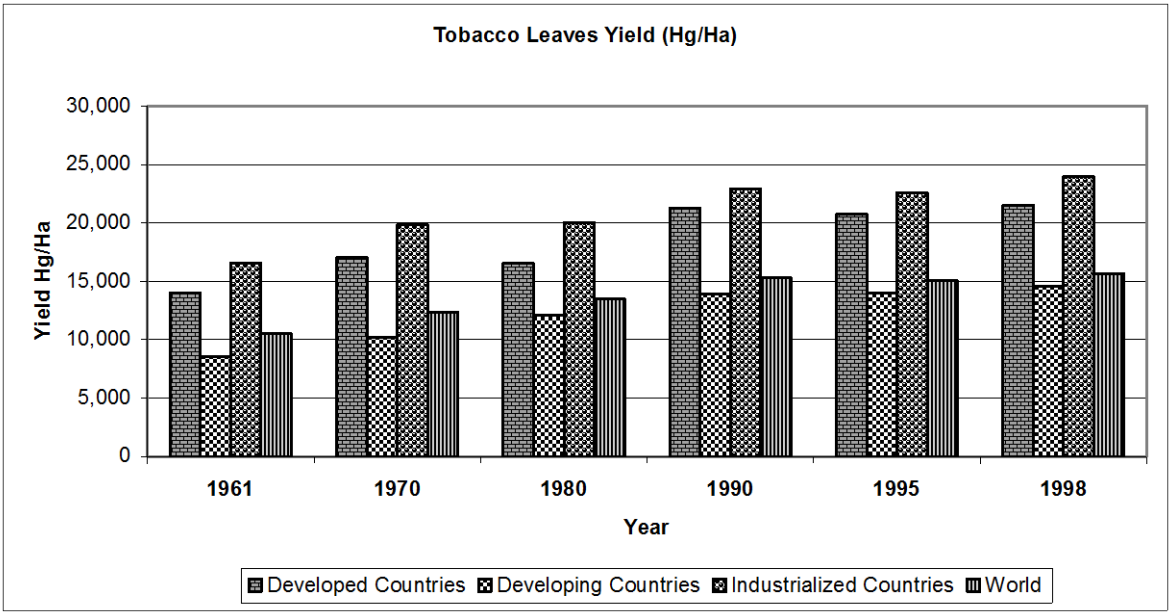


Chart 3b

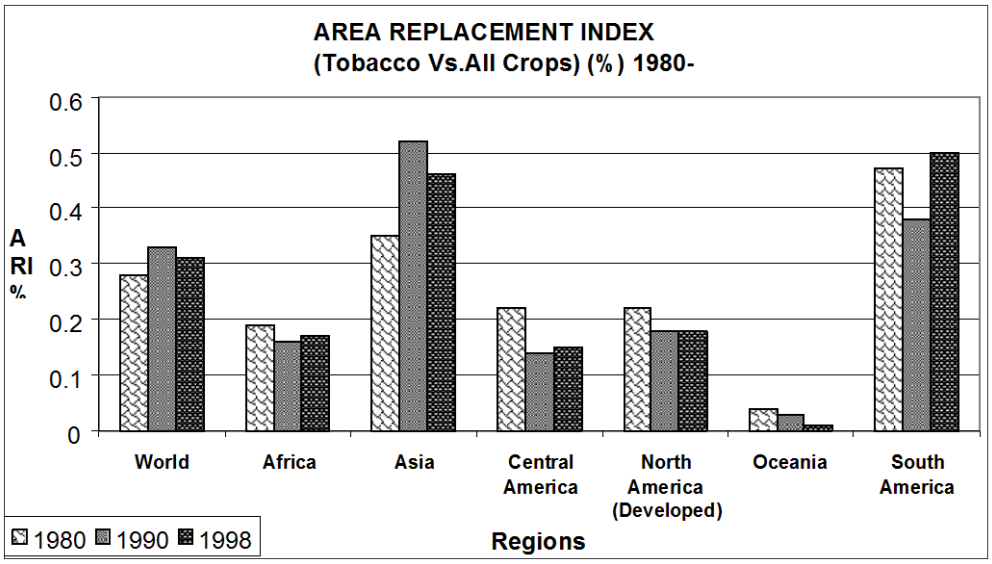



This shows that the scarce resources of the countries are being diverted to researches for discovering new high yielding varieties of tobacco, appropriate fertilizers etc. It is enigmatic that on the one hand, the countries declare their commitment to control tobacco menace and on the other hand, they also promote it !

## 3. Is this killer plant replacing area under food crops and other commercial crops ?

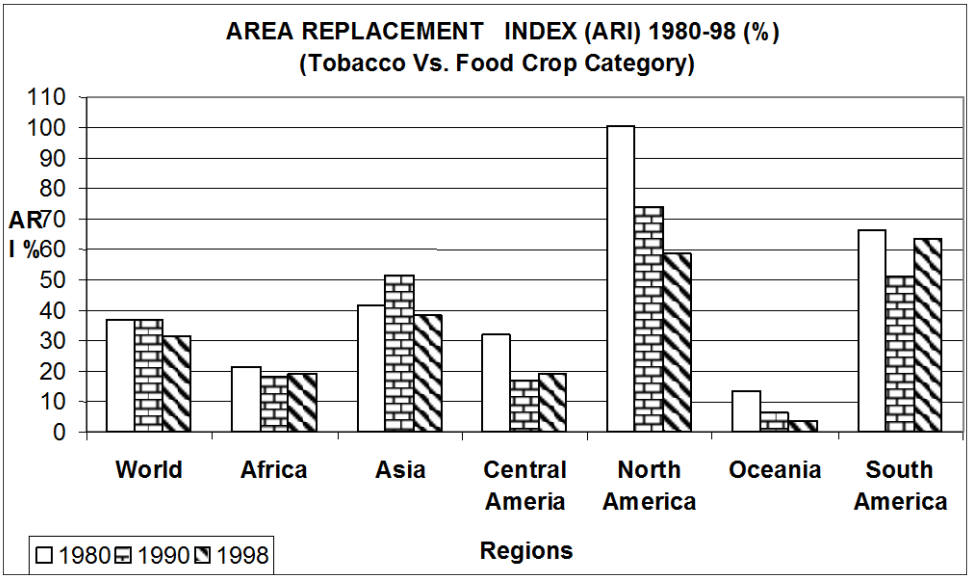
Area Replacement Index (Tobacco Area as percent of total land area), shows that over the past thirty years tobacco has replaced other crops in the world, Except in Asia and South America, in particular, tobacco is found to have replaced other crops significantly, as brought out from charts 3 and 4.

Chart-4




There are indications that tobacco has replaced food crops and even other commercial crops in some countries. That some of the non-tobacco producing countries like Bhutan in Himalayas, have taken to tobacco cultivation in recent years augurs badly for environment and human health.

Chart-5




## 3. What are the determinants of tobacco cultivation ?

Understanding the determinants of tobacco cultivation and of non cultivation of tobacco would help identifying the instrumental variables for tobacco control.

In the present study this question was examined at two levels; (a) Using macro international data and (b) Using micro level household data in India.

The following chart presents a summary of the results of general analysis and the results of more than ***100 regression exercises*** using tobacco area, tobacco production and tobacco yield as dependent variables and several socio-economic variables as independent variables. The nature of causality among variables was first derived on the basis of logical reasoning and then the statistical analysis was attempted. These statistical exercises used both macro and micro level data:

**Chart-6**

**Determinants of Tobacco Cultivation**

| Variables that promote tobacco Cultivation | Variables which discourage tobacco cultivation | Variables about which no firm conclusion is possible |
|---|---|---|
| i. Export price | i. Favourable Gender ratio | i. Irrigation |
| ii. Import value | ii. Guidance about alternative crops. | ii. Export Earnings |
| iii. Price of tobacco and tobacco products | iii. Support for alternative activities | iii) Yield |
| iv. Fertilizer Subsidy | iv. Rate of Return for alternative activities. | |
| v. Size of land holdings | v. Mixed cropping | |
| vi. Luke-warm initiative from the government about tobacco control | vi. Crop Insurance for alternative crops. | |
| vii. Exaggeration of employment, revenue and foreign exchange gains from tobacco | | |

## 5. Why do some farmers not cultivate tobacco ?

A brief study of such farmers in southern part of India showed that economic hazards dissuaded these farmers from tobacco cultivation.

## 6. Suggested approaches for Agricultural Diversification and shifting away from Tobacco Cultivation.

a. **Phased shifting from tobacco cultivation** with supplementary measures for rehabilitating all the affected parties in the backward linkage and forward linkage framework.

b. **Mixed cropping :**

i. Tobacco with sugarcane where irrigation is available
ii. Tobacco with Soybean where irrigation is not available.
ii. Tobacco and Rabi Jawar where irrigation is not available.
iv. Garlic and potato where irrigation is not available.

**These alternatives have been suggested considering the rates of return and economies of scale in cultivation of the respective crops*

c. **Single crop alternative :**

Sugarcane, Soybean, Rabi Jawar, Cotton, Onion, Sunflower, Groundnut.

**These alternatives have been suggested considering the rates of return and economies of scale in cultivation of the respective crops*

d. **Horticulture and Floriculture as alternatives :**

Zimbabwe's experience has brought out economic superiority of these alternatives to tobacco.

e. **Dairy farming and Sericulture as alternatives to tobacco cultivation.**

Interaction with farmers in Karnataka – India has suggested dairy farming as a more remunerative alternative to tobacco, as has been brought out by the CMDR action research study.

## 2. CMDR Action Research on Economics of Shifting from Tobacco :

Action Research sponsored by International Development Research Centre (IDRC), Canada, and undertaken by Centre For Multi Disciplinary Development Research, India, showed that majority of 2000 farmers in surveyed region of India were willing and keen to shift if they were guided about the alternative crops/ alternative activities.

CMDR evolved a strategy for alternatives for tobacco cultivation by closely involving the farmers. ***Endogenously evolved reforms are obviously more likely to be effective than exogenously imposed reforms.*** The truth of this was realized in CMDR action research study. A baseline survey of 2000 farmers (of whom 1652 were tobacco cultivators), in the bidi tobacco region revealed the following :

i) Richer farmers tend to prefer tobacco cultivation to other crops,

ii) Small farmers take to tobacco cultivation as something inevitable in the absence of a suitable alternative,

iii) Tobacco uses maximum quantity of human and bullock labour amongst all the other crops of the region,

iv) Cost of cultivation for tobacco is much higher than for other crops,

v) Marginal farmers in particular, face the pinch of this high cost more severely than others,

vi) Since the gross returns from tobacco are much higher than in the case of other crops farmers are carried away by this. This, therefore, camouflages the high cost of cultivation of tobacco. Farmers normally do not capture the full economic implications - both costs and returns - of tobacco cultivation,

vii) The net return from tobacco is lower, in fact, than for many other crops. Sugarcane fetches even higher net return than tobacco. However, the Sugarcane cultivation requires heavy irrigation facilities, regarding which special initiatives have to be taken by the policy makers,

viii) **Economies of scale for tobacco cultivation** are not very favourable in comparison with other crops,

ix) Tobacco cultivating households experience many **other unfavourable effects** from tobacco cultivation, tobacco storing at home, and tobacco curing in the sun, or through wood fuel near their houses, etc., Frequent spray of fertilizers and insecticides required for protecting the tobacco plant from diseases, is found to be causing skin diseases and respiratory ailments for farmers. Smell of stored tobacco bags (bod's) in houses is found to spoil cooked food. Plucking of leaves, frequent touching of leaves, etc., are found to cause skin irritation and skin diseases. Aroma of tobacco due to storing and sun curing and wood fuel smoke due to fuel curing of tobacco have been found to cause respiratory problems for children and women, in particular, of the tobacco cultivating families,

x) Use of children in tobacco agricultural operations has kept them away from schooling,

xi) Tobacco marketing has been a major problem and middlemen have been exploiting farmers,

xii) Longer period required for tobacco agriculture (nearly 6 months) as compared to other crops (say 3 to 4 months) was also recognized by the farmers as a negative aspect of tobacco cultivation.

Such experiences of tobacco farming households, as learnt from our micro level field study, in India, show that farmers are quite vexed of tobacco agriculture and are willing and keen to shift to other crops or other activities if suitable alternatives are shown to them.

**MIXED CROPPING**

Mixed cropping may be a better alternative for agricultural diversification away from tobacco. ***Tobacco –plus- garlic*** recorded maximum total yield followed by ***tobacco and Rajmash.*** ***Maize -Plus- Potato ,*** ***Garlic and Potato*** are also attractive tobacco free mixed cropping alternatives.

From our field study in bidi tobacco area it was found that ***mixed cropping with jawar*** is more profitable than exclusive tobacco cultivation. ***Tobacco and groundnut*** is also a recommended alternative to tobacco cultivation.

A package of mixed cropping, shift to other crops with a suitable crop insurance facilities, adequate farm inputs for the alternative crops, adequate marketing facilities etc., would be necessary in order to ensure the success of this policy of gradual shift from tobacco.

Tobacco farmers are also keen to shift to dairy farming if suitable assistance is given.

8. Under the action programme of the project, a focus group of 100 farmers was chosen for examining the process of their shifting from tobacco cultivation.

Analysis of the data relating to this focus group revealed the following :

i. Farmers with big land holdings preferred to take up dairy farming in place of tobacco.

ii. Small farmers preferred Soybean as an alternative.

iii. CMDR acted as a facilitator for bank assistance from regional developmental banks for purchase of milch animals.

iv. The Centre also laisoned to link dairy farmers with milk cooperatives for sale of milk. The Centre also facilitated the discussion of the farmers with insurance company, for possible risk coverage in the process of shifting from tobacco.

v. CMDR has agreed to bear part of bank loan repayment for a year to ensure shifting. Repayment has already started. CMDR has entered into an agreement with dairy farmers / tobacco shifters, to this effect.

vi. Centre has instituted an endowment for giving prizes in a school in the project area, payabe to better performing children of farmer parents who have shifted from tobacco. This is expected to perpetuate the message of the action project for shifting from tobacco cultivation.

vii. Majority of farmers have opted to grow soybean in place of tobacco, to whom CMDR has distributed free quality soybean seeds, adequate for one acre of holding.

viii. As a matter of strategy phased shifting from tobacco was advised.

ix. 44 percent of beneficiary farmers have not grown tobacco at all, 14 percent have devoted less area (50 percent reduction) for tobacco as compared to previous year, 10 percent have reduced tobacco area by 25 percent. The rest have shifted marginally.

x. About 60 percent of non-shifters during the current year have given a commitment to fully shift from tobacco with effect from the next year.

xi. More than two thirds of farmers in the region, had already shifted without any incentive, being fully convinced of the economic hazards of the killer plant.

xii. On the whole, as at present, the experience of the CMDR action project has been quite encouraging. However, since the message of the project should be sustained, we are taking care to monitor the process of shifting over the next 3 to 4 seasons.

**xiii.** This action research has revealed that **micro level interventions in different regions might probably help realize the objective of agricultural diversification away from tobacco.**

9. A brief study of agricultural diversification in other countries for control of other merit bads suggests that a concerted action with a package of measures might be helpful in achieving the objective. Educating farmers about the economic hazards of tobacco would be the dominant strategy of this package of measures.

10. In the following chart the main elements for inclusion in FCTC are outlined. These elements are derived from a number of statistical exercises reported in the paper and also CMDR action research.

**Chart-6**

## Elements for inclusion in FCTC

| Elements | Agency for Action | Any Formal Framework needed for the initiative ? |
|---|---|---|
| a) **National Initiatives** | | |
| i. Developing **Micro level Information Bank** about<br>a) Determinants of tobacco cultivation and<br>b) About the factors for not cultivating tobacco. | a) Action oriented Research institutions<br>b) Tobacco farmers. and others. | MoUs with Action Research Agencies for developing a micro level information bank |
| ii) **Sensitizing tobacco cultivators** about the ill effects of such cultivation. | a) NGO's<br>b) Women's organizations.<br>c) Agricultural Scientists.<br>d) Medical experts.<br>e) Tobacco farmers and<br>f) Religious leaders. | |
| iii) **Educating tobacco farmers** about agricultural diversification away from tobacco – alternative crops. And / or about nonagricultural activities. | a) Tobacco farmers and Farmers who have already shifted from tobacco.<br>b)Innovative farmers of other crops.<br>c) Agricultural Scientists,- Soil experts, | Agreements to be reached between governments and tobacco cultivators for phased shifting from cultivation of the merit bad incorporating the deadline for complete shifting. |

**Elements for FCTC : Chart-6 (contd)**

| Elements | Agency for Action | Any Formal Framework Needed for the initiative ? |
|---|---|---|
| **Phased shifting from tobacco.** | d) NGO's and grass root level voluntary organizations.<br>e) Religious leaders. | b.)NGO's and farmers' organizations to be involved for monitoring strict implementation of agreements. |
| iv) **Educating farmers** about economics of tobacco | a) Tobacco farmers and other farmers | |

| | | |
|---|---|---|
| cultivation and cultivation of other crops, **highlighting lower net returns for tobacco** | b) Agricultural economists. | |
| v) Deterrent indirect taxes on tobacco leaves and tobacco products. | a) National and State governments. | a) Suitable amendments to the National Constitution wherever necessary.<br>b) Tax Laws to be passed.<br>c) Strict implementation of Laws to be ensured.<br>d) Farmers' organizations. NGOs, Grassroot level voluntary organizations, etc., to be involved in monitoring i)implementation of Tax Laws, ii) Income Support Schemes, iii)Regulations on tobacco trade and smuggling.<br>iv)Other suggested measures. |
| vi) Regulating Prices of tobacco leaves. | -do- | -do- |
| vii) Withdrawl of all types of subsidies to tobacco farming. | -do- | -do- |
| viii) Stoppage of grants for tobacco promotional research. | -do- | -do- |
| ix) Income support to tobacco farmers for reducing tobacco output / complete shifting from tobacco cultivation. | -do- | -do- |
| x) Cross subsidization of erstwhile tobacco farmers from indirect taxes on tobacco products. | | |
| xi) Debt liquidation of tobacco cultivators and alienating them from traders. | -do- | -do- |
| xii) Phased reduction in exports and imports of tobacco leaves and tobacco products | -do- | -do- |
| Xiii) Control on smuggling | | |

**Elements for FCTC : Chart-6 (contd)**

| Elements | Agency for Action | Any Formal Framework needed for the initiative ? |
|---|---|---|
| b) **Initiatives from developed countries**. | -do- | -do- |
| i) Phased reduction in R & D expenditure relating to tobacco farming and use the amount so | -do- | -do- |

| | | |
|---|---|---|
| saved to provide income support to farmers who have shifted from tobacco in developing and developed countries. | | |
| ii) Stop export of tobacco leaves and tobacco products to other countries. | National Governments of developed countries and governments of tobacco dependent developing countries. | -do- |
| Iii) Stop imports of tobacco leaves and tobacco products from other countries<br>Mere import restrictions invoking social clause (because child labour is involved in tobacco cultivation and tobacco product manufacturing ) would be unfair and would amount to overlooking the intense poverty of households involved in such actions. This should be supplemented by income support programmes | National Governments of different countries. | International Agreements on Cooperation for Tobacco Control (IACTC) |
| iv) Assist those tobacco dependent countries for R&D of alternative uses of tobacco. Motivate tobacco multinationals for starting plants in such countries for alternative uses such as protein extraction from tobacco plant and others medicinal uses. | a. Governments<br>b. Tobacco multinationals. | a) Legal arrangements with multinationals for approved uses of tobacco, to be overseen by WHO.<br><br>b) International Monitoring mechanism through WHO for ensuring strict adherence to the agreements. |
| ***c. Initiatives from Tobacco Dependent Developing Countries*** | | -do- |
| i.)Forming Regional Associations of Tobacco Dependent Developing Countries | Governments<br>NGO's and Activists | |
| ii. Levy Uniform and deterrent tax on transactions in tobacco products (the incidence to fall on the dealers and purchasers) | | |
| iii. Present a common front before developed countries for<br>a.) Not exporting tobacco leaves | National Governments | International trade agreements |

**Elements for FCTC : Chart-6 (contd)**

| Elements | Agency for Action | Any Formal Framework needed for the initiative ? |
|---|---|---|

| | | |
|---|---|---|
| And tobacco products<br>b.) Not providing implicit support to tobacco multinationals<br>c.) Providing financial assistance for de-coupled income support to shifting farmers<br>d.) Providing assistance for starting plants for alternative approved uses of tobacco | National Governments<br>International bodies like WHO, IMF, World Bank | Memorandum of Understanding (MoU) to be signed by developing nations with agricultural diversification from tobacco as the main clause of MoU |

# AGRICULTURAL DIVERSIFICATION AS A TOOL OF TOBACCO CONTROL

***Dr.P.R.Panchamukhi****

## I. INTRODUCTION

Tobacco consumption and tobacco cultivation have assumed proportions of an epidemic. Tobacco disease has been termed as the communicated disease. Tobacco plant is therefore rightly called as a killer plant. But tobacco control cannot succeed until it is recognized that tobacco plant is not only a killer plant but it also is a highly costly plant to cultivate. Tobacco as a commercial crop and tobacco products like snuff, chewing tobacco, gutka, bidi, cigarette, hukka, pipe etc as commodities with almost assured demand, make tobacco industry as an unique industry in the world. Tobacco multinationals seem to be shifting their focus to the developing countries of Asia and Africa, in particular. Though in developed countries tobacco-related activities (cultivation, production and consumption of tobacco products, etc.) seem to be under control, new tobacco traditions are being floated to keep the tobacco industry quite healthy throughout the world. Such new traditions consist of smoking by girls and women, gutkha consumption by school & college children and vociferous advertisements of tobacco, linked with very popular games & sports etc.

Tobacco industry has been a major industry in many countries despite recognition that tobacco is a major health hazard. Control of this industry is therefore, the prime necessity. This industry has to be controlled from both the demand side and from the supply side. One has to see whether the demand side can be fully controlled, for, demand covers both domestic consumption demand and also demand for exports to the other countries, catering to the consumption needs of the importing country. Hence, when the domestic demand is controlled within a particular country, it would cover only a part of the problem. But still this is important. Domestic demand has to be controlled, by various restrictive policies on the act of consumption. For example, wherever price elasticity of demand is high, the prices of tobacco and tobacco products may be raised significantly deterring tobacco consumers from purchasing them. Quota restrictions on consumption may also be imposed on consumers. If there are no other avenues of supply-clandestine or open - then such quantity restrictions may prove to be quite effective, other things remaining the same. Policies to educate consumers about the adverse effects of tobacco consumption, appeals through religious leaders and opinion makers, declaring tobacco consumption as anti religion, etc., can be extra-price measures for controlling demand. Except the price-instrument, all other instruments interfere with consumer sovereignty, which is justified in the background of tobacco as a 'merit bad'. [1]

* *Director*, Cenntre for Multi-disciplinary Development Research, Dharwad, Karnataka State, (INDIA).

[1] 'Merit bad' is the term which is converse of the term merit good' as enunciated by the fiscal economist Richard Musgrave : *Theory of Public Finance*, McGraw-Hill Book Company. Inc.1959

While the instruments of control from the demand side should be considered as surer methods of controlling tobacco industry, other things remaining the same, we must appreciate that demand for tobacco is controlled more by endogenous factors rather than the exogenous factors outlined above. Addiction to drugs, tobacco etc, has its own rationality. A tobacco-addict would explain his addiction as something, which benefits him. If the endogenous factors promoting tobacco consumption are more powerful than the exogenous factors controlling consumption, then no amount of manipulating the latter is likely to be effective. In such a situation, for controlling tobacco industry one has to necessarily rely upon controlling the supply itself rather than the demand. The noted classical economist J.B.Say, says, ***'Supply creates its own demand'. An extended version of this adage may be stated as, 'control of supply would control its own demand'.*** If the lack of supply is sustained, and if there are no easy means of getting the supply, then the demand for a particular commodity may get controlled as a matter of habit. For example, if cigarettes are not easily available to a smoker, and if there is no way of getting them also, then a cigarette smoker might, with some difficulty, adjust his behaviour to such a controlled cigarette-less situation. Hence, the supply factors might play their role in moulding consumption habits of the individuals. It must be conceded, however, that the **demand side controls of demand** are surely more dependable and sustained as compared to the **supply side controls of demand.** In the case of the supply side controls there is an element of compulsion on the consumer, which in the interest of his welfare and social welfare, is justified. That is why tobacco control policy from both the demand side and the supply side can be considered as an action directed against the **'merit bad'** of tobacco.

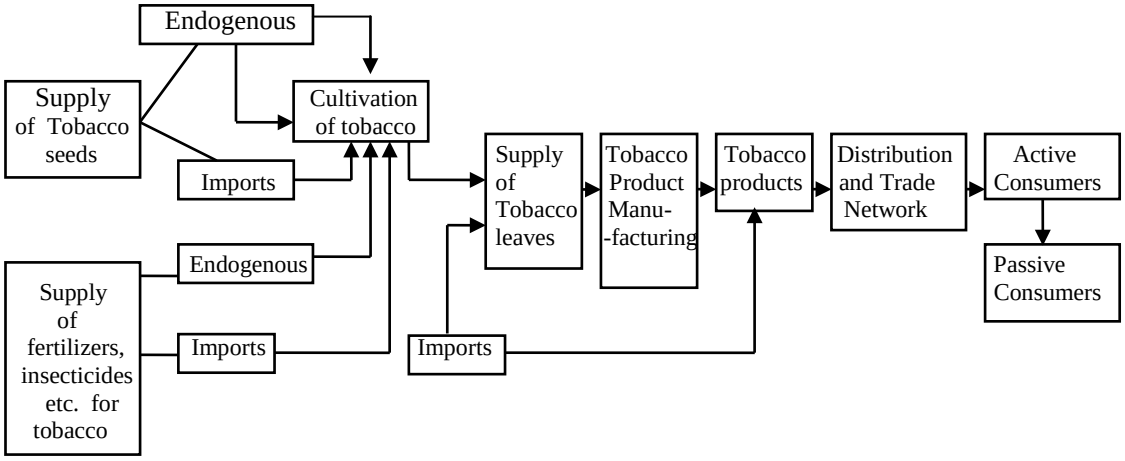
The supply side controls on tobacco industry may take two forms

(a) complete elimination of supply of tobacco, thereby affecting the supply of tobacco products.

(b) gradual reduction in the supply of tobacco, thereby influencing the supply of tobacco products.

The following flow chart presents an idea about how supply and consumption of tobacco are linked, and which can be the action points for the policy maker for the purpose of control of supply.

**Chart-1**
**Flow Chart of Process of Tobacco Supply Indicating Control Points of Supply**




Since the supply of tobacco products including the supply of cultured tobacco leaves is a function of tobacco cultivation within the country and/or imports, the control of supply has to be directed towards these two aspects. **We wish to address in this paper, only to the tobacco cultivation aspects for the control of tobacco supply.**

The discussion is divided into ***twelve*** sections according to the following plan.

*1.* Introduction

*II.* Tobacco Crop – Basic Aspects of Cultivation

*III.* Trends in Tobacco Cultivation : Aggregate Perspectives

*IV* Determinants of Decision to Grow or Shift from Tobacco

*IV-A* A Multivariate Statistical Analysis of Tobacco Harvested Area : An International Perspective

*IV-B* Price Elasticity of Supply of Tobacco

*V.* Economic Aspects of Tobacco Cultivation in India : Insights for Shifting

*V-A* Determinants of Tobacco Cultivation : A Village Level Analysis for India

*V-B,* Agricultural Output Function for Tobacco and Other Crops : A Comparative Perspectives

*VI.* Economics of Inter-cropping System as an approach in Agricultural Diversification

*VII.* Implications of Diversification of Agriculture Away from Tobacco

*VIII.* Measures for Implementing Agricultural Diversification

*IX.* Lessons from Experiences of Selected Countries,

*X.* Any Lessons from Agricultural Diversification in other Countries engaged in Cultivation of Merit Bads like Coca and Poppies ?

*XI.* Concluding Observations.

*XII* Proposed Elements for FCTC-Framework Convection Tobacco Control.

## II. TOBACCO CROP: BASIC CULTIVATION ASPECTS

Probably man has invested more time and energy to develop tobacco varieties than to develop varieties of food grains ! It is said that there are as many as sixty five valid species of tobacco in the World. But two species, viz. "Nicotiana Tabacum' and 'Nicotiana Rustica' have been the most popular varieties grown. There are sub varieties under each of the species developed according to the use to which it is put. For example, in India under the former species more than nine varieties are grown such as cigarette tobacco (Virginia flue cured), bidi tobacco, chewing tobacco, hookah tobacco, cigar tobacco, charoot tobacco, snuff tobacco, natu tobacco, burley tobacco etc.

Tobacco crop generally takes 6 to 7 months to mature from the day it is sown. It is grown in the Rabi season with sowing done during July-August while sowing of most of the food crops is done in May-June, indicating that tobacco is a highly competitive crop to food crops. In some regions sowing is done during March – April also. ***This shows that the sowing of tobacco preempts the sowing of food crops.***

It is sown on black soil and light soil. Deep ploughing is required before tobacco seeds are sown and nurseries are developed. Different dozes of fertilization are required for different types of tobacco. Normally, N, $P_2O_5$, $K_2O$, NPK etc are applied. Tobacco requires significantly large amount of fertilizer input, much more than in the case of other crops. (Appendix-Photograph –1)

Right from the stage of sowing and plant breeding tobacco is found to be a costlier plant to cultivate than other crops, though these costs are not clearly visible since farmers with small holdings and maintaining subsistence agriculture, do not have the practice of keeping accounts for all the items of cost, both direct and indirect.

Different spacing of transplantation is followed, varying between 70x 50cms to 100x100cms. Though heavy irrigation is generally not required for tobacco, in practice farmers use irrigation facilities quite intensively for tobacco also in the interest of earning more income disregarding the effects that heavy irrigation would have on the quality of the soil. There is also a high opportunity cost of use of unnecessary irrigation for tobacco, for, this would deprive other crops of the irrigation facilities. Topping is done to get better yield. De-suckering is done either by hand or by using certain de-suckericides like De canol, Accotab or Peelakill in water or oil. Harvesting is done when the plants

develop spangles. It is most important that rains do not fall at this stage, otherwise the entire crop is destroyed. With uncertainty of the monsoon tobacco plant always faces the risk of complete loss. Farmers are aware of this risk. But still they continue to grow tobacco being guided by the traders who provide credit to them. When the rains destroy the tobacco crop the farmers once again fall into the debt trap of the traders.

Harvesting is done after the leaves mature. All leaves do not mature simultaneously. There are different methods of harvesting viz., priming (lower leaves cut first) by adopting the stalk cut method, whole plant harvest, gugro method (green lamina of the mature leaves being cut), etc. Once harvesting is done, then drying process is initiated which is called ***curing***. Flue curing (drying in barns under different temperature), bulking, air curing, fire curing, sun curing,(Appendix Photograph-2) pit curing, etc., are the varieties of curing methods. Curing of tobacco with the help of wood fuel compels farmers to fell or cut the trees in their fields or purchase wood from outside for the purpose. Thus, tobacco cultivation is invariably associated with depletion of forests. Burning of wood for the purpose of curing would also mean air pollution in the surroundings of tobacco fields. Farmers cultivate tobacco and are engaged in its curing regardless of these harmful activities. ***It appears that the farmers are under some compulsion to do all this even though they are aware of these risks associated with tobacco growing.*** Since the tobacco plant is very delicate, vulnerable to diseases and pests farmers are required to use various types of insecticides and pesticides to protect the tobacco plant from various insects and pests, which normally frequent the plant at different stages. (Appendix Photograph-3-to-8) Very careful nurturing of the plant is required throughout its lifetime. The entire family labour and sometimes hired labour may have to be put in service to protect the plan throughout the period of tobacco cultivation. Intensive utilization of human labour (mostly women & children) is involved in this process. (Appendix Photograph-7) ***Therefore, most often it is the women and children, who are more vulnerable to such hazards.*** In addition, the farmers with small holdings may be compelled to use children for nurturing tobacco constantly and hence ***such children would miss the opportunity of going to school.*** (Appendix Photograph-2)

Harvested and cured leaves are sent to different use outlets such as Bidi manufacturing units, Cigarette factories, Gutkha factories, etc. Transportation of tobacco to such manufacturing units is generally the responsibility of the men folk of tobacco growing families, who get money from the tobacco purchasing traders. Mostly, the money is paid by the traders after making adjustments for the previous debts of the farmers. ***The women and children who are mostly engaged in tobacco cultivation would not be even aware of the amount of money received and the debt transactions of the men folk of the family.***

Despite the infliction of the various burdens and stresses on the members of the tobacco farming families the tobacco cultivation has continued in many countries. The global and country-wise trends in tobacco cultivation are brought out from the following discussion.

## III. TRENDS IN TOBACCO CULTIVATION : AGGREGATE PERSPECTIVES ABOUT AREA, PRODUCTION AND YIELD :

Tobacco harvested area in the world increased from 3.4 million hectares in 1961 to 4.50 million hectares in 1998. It is worth noting that while tobacco area declined in developed countries and industrialized countries it has increased significantly in developing countries during the same period. While yield has increased by 45 - 53 per cent in developed and industrialized countries, it increased by 70 per cent in developing countries. Though the level of yield is much higher in developed countries than in developing countries. Another notable feature is that tobacco leaves production increased only in developing countries while in the developed and industrialized world it declined. These details are presented in the table and the charts below :

**Table 1**
**TOBACCO LEAVES AREA HARVESTED, PRODUCTION AND YEILD**

| | 1961 | 1970 | 1980 | 1990 | 1995 | 1998 |
|---|---|---|---|---|---|---|
| **Tobacco Leaves Area Harv (Ha)** | | | | | | |
| Developed Countries | 1,214,784 | 1,191,355 | 1,205,491 | 880,048 | 644,979 | 704,678 |
| (% to world total) | **35.75** | **31.60** | **30.93** | **18.91** | **15.54** | **15.64** |
| Developing Countries | 2,183,374 | 2,578,931 | 2,692,571 | 3,773,671 | 3,506,286 | 3,800,272 |
| (% to world total) | **64.25** | **68.40** | **69.07** | **81.09** | **84.46** | **84.36** |
| Industrialized Countries | 846,555 | 728,943 | 727,067 | 594,317 | 487,134 | 511,793 |
| (% to world total) | **24.91** | **19.33** | **18.65** | **12.77** | **11.73** | **11.36** |
| World | 3,398,158 | 3,770,286 | 3,898,062 | 4,653,719 | 4,151,265 | 4,504,950 |
| Total % | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** |
| **Tobacco Leaves Yield (Hg/Ha)** | | | | | | |
| Developed Countries | 14,008 | 17,018 | 16,544 | 21,283 | 20,753 | 21,509 |
| Developing Countries | 8,575 | 10,225 | 12,123 | 13,938 | 13,977 | 14,587 |
| Industrialized Countries | 16,563 | 19,869 | 20,065 | 22,911 | 22,604 | 23,971 |
| World | 10,517 | 12,371 | 13,490 | 15,327 | 15,030 | 15,670 |
| **Tobacco Leaves Production (Mt)** | | | | | | |
| Developed Countries | 1,701,611 | 2,027,457 | 1,994,358 | 1,872,986 | 1,338,528 | 1,515,664 |
| (% to world total) | **47.61** | **43.47** | **37.93** | **26.26** | **21.45** | **21.47** |
| Developing Countries | 1,872,204 | 2,636,919 | 3,264,237 | 5,259,589 | 4,900,732 | 5,543,617 |
| (% to world total) | **52.39** | **56.53** | **62.07** | **73.74** | **78.55** | **78.53** |
| Industrialized Countries | 1,402,144 | 1,448,316 | 1,458,871 | 1,361,655 | 1,101,120 | 1,226,834 |
| (% to world total) | **39.23** | **31.05** | **27.74** | **19.09** | **17.65** | **17.38** |
| World | 3,573,815 | 4,664,376 | 5,258,595 | 7,132,575 | 6,239,260 | 7,059,281 |
| Total % | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** |

*Note : Bold letter indicate Percentages*

*Source : Basic Data are derived from Food and Agriculture Organization statistical database*

Chart-2

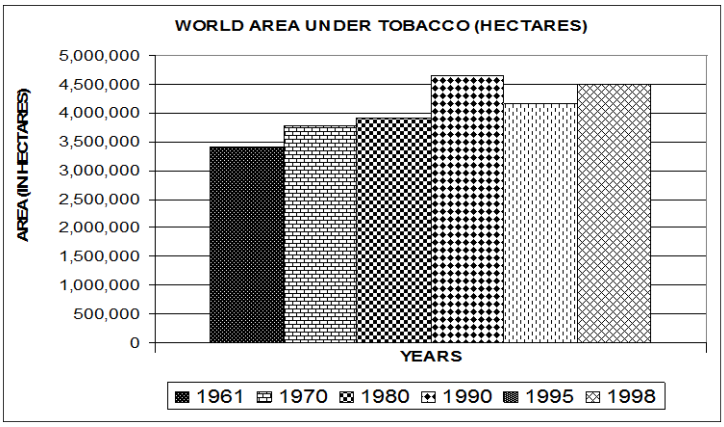



Chart 3

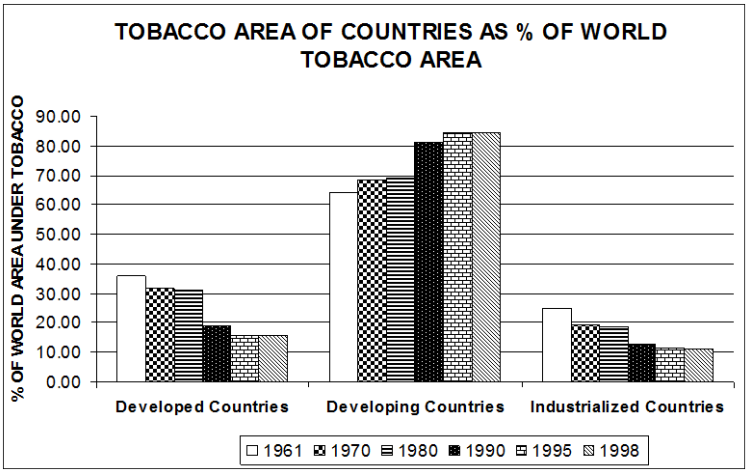
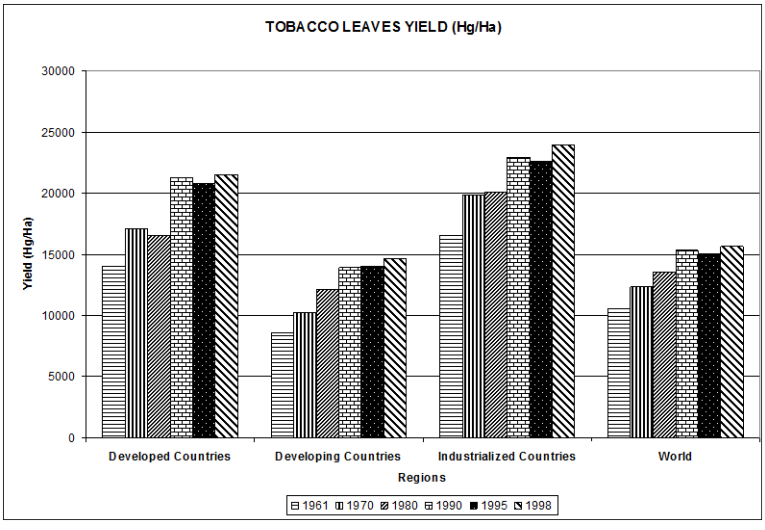



Chart-4



If we focus on area under tobacco, we notice certain disturbing trends. Though during the five year period of 1993-98 the area declined by more than 15 percent, what is really disturbing is the fact that tobacco area once again increased (by 8 per cent) during the recent period of 1995-98. That this has happened despite the concerted anti-tobacco drive of recent years is all the more a cause of concern.

***Thus, there is no definite trend of change in the tobacco - harvested area in the world. Occasional decline has been followed by increases in area.*** Sustained decline in the area under tobacco does not still seem to be within sight as was seen from chart-2 above.

Country wise data reveal interesting aspects. For example; some countries where tobacco cultivation was nil some 25-30 years ago[2], have now started cultivating tobacco. The countries like Bhutan, Saint Vincent, Sierra Leone, West Bank, etc., are such countries where tobacco area was nil in 1970; but these countries have taken to tobacco cultivation thereafter. ***For example; Bhutan, a tiny country of the mighty Himalayas, is now using 110 hectares of its small land area for tobacco cultivation!*** There are other countries where tobacco area harvested was small in 1970 but which increased in the subsequent years. For example, Chad used only two hectares of its land for tobacco harvesting in 1970s but this area increased to nearly 144 hectares in 1998. So also is the case with regard to Haiti where tobacco harvested area increased from 150 hectares in 1970 to 400 hectares in 1998. Of course, there are also examples of countries which reduced tobacco area in recent years. In Maldives, the area increased from 87 hectares in 1970 to 850 hectares in 1995. But, only during 1995-98 the area declined sharply from 850 hectares to 200 hectares. Thus, there are mixed cases of increase and decreases in the area used for harvesting tobacco. The following table presents a summary picture of the change in the area for tobacco harvesting during 1970-98.

**Table 2**
**Number of Countries where tobacco area changed during the period**

| No. of Countries | 1970-80 | 1980-90 | 1990-98 |
|---|---|---|---|
| a. Where area increased | 60 | 45 | 43 |
| b. Where area decreased | 53 | 65 | 52 |

Data about area, production and yield for the world in the first fifteen tobacco producing countries provide further insights about the importance that tobacco cultivation is receiving. In 1998, China, India, Brazil, USA, Turkey, Indonesia, Malawi, Zimbabwe, Australia, Greece, Philippines, Pakistan, Thailand, Italy and Korea [Democratic People's Republic (DPR)] ranked as the first 15 countries in respect of area of tobacco harvest. These countries shared 81 per cent of world's tobacco area and 83 per

[2] Reporting accuracy, of course, varies across the countries ( *See Appendix Table 1)*

cent of world's total tobacco production. Their average yield was higher than the average yield for the entire world. It is also interesting to note that the harvested area under tobacco in these countries increased from 66 per cent of world's harvested area to 81 percent during 1970-98. Similarly, the total production of these 15 countries also increased from 59 per cent of world's production to 83 percent of world's production during this period. Thus, from many points of view these countries can be considered as more important from the point of view of tobacco control initiative from the supply side.

Table 3 below presents the details for these aspects for the world and the first thirteen tobacco producing countries for which more dependable data are available.

**Table 3**
**Indicators of Tobacco Cultivation in the World and in 13 major Tobacco Cultivating Countries (1970-98)- percentage changes**

| | 1970-80 | 1980-90 | 1990-98 | 1970-98 |
|---|---|---|---|---|
| ***TOBACCO AREA*** | | | | |
| World | 2.60 | 19.20 | -3.20 | 19.60 |
| Major Tobacco Cultivating Countries | Marginal decline | -6.50 | 33.30 | 24.70 |
| ***TOBACCO PRODUCTION*** | | | | |
| World | 12.90 | 35.60 | -1.00 | 51.50 |
| Major Tobacco Cultivating Countries | 9.10 | 50.30 | -17.20 | 54.00 |
| ***TOBACCO YIELD(Hg/Ha)*** | | | | |
| World | 9.00 | 13.60 | 2.20 | 26.70 |
| Major Tobacco Cultivating Countries | 4.70 | 23.30 | 0.60 | 29.80 |

Note: Basic data about the above aspects are compiled from FAO,

The table shows that during 1970-98, area for cultivating tobacco, tobacco production and tobacco yield, have all registered significant increases. Though during recent years 1990-98, area for cultivating tobacco and aggregate tobacco production have shown some decline, the yield is continuing to increase.

***Focus on area devoted for tobacco harvesting, provides interesting insights useful for agricultural diversification.***

***In majority of the major tobacco cultivating countries area harvested registered an increase during 1980-1998.*** The exceptions are USA, Philippines, Thailand, and Italy**. Thus, in 9 out of 13 major tobacco *harvesting countries the area actually increased.*** If we consider the experiences of these 13 countries during 1980-98 and compare changes in area with changes in yield the picture is quite revealing. **In 21 out of the total of 59 cases during this period the yield increased even when there was a reduction in the tobacco area.** Thus**, from many counts, tobacco initiative in recent years does not seem to have had a very significant effect on the supply side of tobacco.**

## *Has tobacco replaced other crops in respect of area harvested ?*

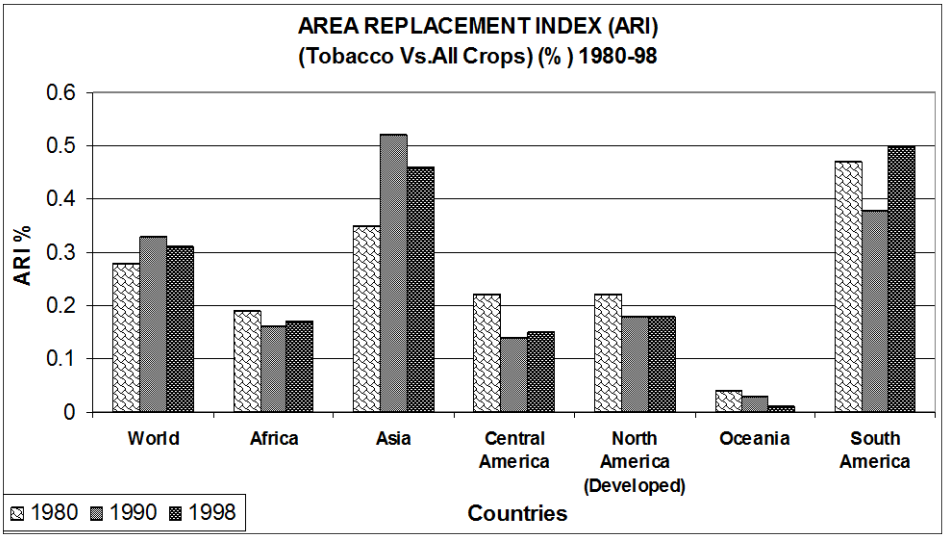
Since area harvested for tobacco seems to have declined in a number of cases tobacco might not have replaced other crops in respect of area. **However, since the yield of tobacco has registered a significant rise, the economic effort on tobacco seems to have increased in relation to that for other crops.** The following discussion brings out region by region and country by country, a picture of change in the importance given to tobacco in relation to other crops. For this purpose an ***Index of Area Replacement by tobacco*** was worked out for major crops and for the major time points from 1980 to 1998. **The index of area replacement is defined as harvested area under tobacco as a percentage of harvested area under other crops.** We have considered the cereals, coarse grain, fiber crops, fruits, jute, jute like fiber, oil crops, pulses, vegetables and melons as the major crops other than tobacco in the specified regions and countries.

The following table and the chart bring out major trends in the **Area Replacement Index (ARI)** in **different regions** over the years.

**Table 4**
**Area Replacement Index (Tobacco Vs. All Crops) (%)**
**1980-98**

| Regions | 1980 | 1990 | 1998 |
|---|---|---|---|
| World | 0.28 | 0.33 | 0.31 |
| Africa | 0.19 | 0.16 | 0.17 |
| Asia | 0.35 | 0.52 | 0.46 |
| Central America | 0.22 | 0.14 | 0.15 |
| North America (Developed) | 0.22 | 0.18 | 0.18 |
| Oceania | 0.04 | 0.03 | 0.01 |
| South America | 0.47 | 0.38 | 0.50 |

Chart-5



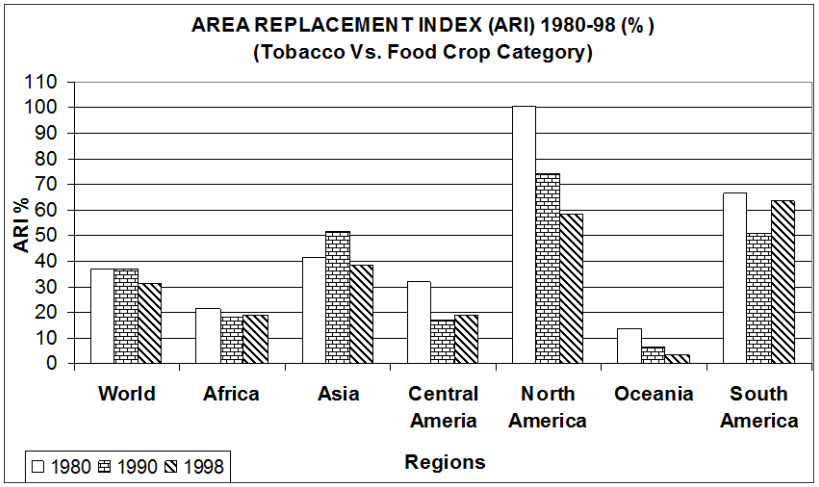
**This shows that during the past 30 year period, tobacco replaced other crops so far as land area for cultivation in the world is concerned.** In Asia and South America harvested area for tobacco has relatively increased as compared to other crops during 1980-98. In all other regions however, the area replacement index has declined. During 1990-98, the picture is encouraging for Asia, while for Africa, Central America and South America it is discouraging. The developed region of North America presents a picture of a status-quo position.

The crops-specific Area Replacement Index is presented in the following table and the chart.

**Table 5**
**AREA REPLACEMENT INDEX (ARI) 1980-98 (%)**
**(Tobacco Vs. Food Crop Category)**
(Food Crops = Grains + Fruits + Oils + Vegetables + Pulses)

| | 1980 | 1990 | 1998 |
|---|---|---|---|
| World | 36.90 | 37.20 | 31.60 |
| Africa | 21.60 | 17.80 | 19.00 |
| Asia | 41.70 | 51.70 | 38.50 |
| Central America | 31.80 | 17.20 | 18.90 |
| North America | 100.50 | 73.80 | 58.60 |
| Oceania | 13.40 | 6.60 | 3.60 |
| South America | 66.40 | 51.00 | 63.60 |

Chart-6




Tobacco cultivation does not seem to have replaced food crops in any of the regions of the world. However, the extent of decline in the area replacement index (ARI) is minimum in Asia and Africa as compared to other regions. ***It is worth nothing that the area replacement index continues to be significantly high in North America and Asia, indicating that there is a 'potential danger' of tobacco replacing the other crop area.*** That there is a potential danger is more pertinent in Asia, as, the index actually increased during 1980 to 1990 in this region, which, though, declined subsequently.

Country-wise trends provide further insights in this connection.

In the case of Argentina, for example, tobacco seems to have replaced all these specified crops marginally, because, the **area replacement index** has shown a marginal increase from 0.25 percent to 0.29 percent. In the case of cereals, coarse grain, fruit, pulses, vegetables and melons this index has registered an increase of varying magnitudes during the period 1980-98. This shows that most of the food crops cultivation seems to have been affected by increased emphasis on tobacco cultivation in Argentina.

In Brazil also, there is a marginal increase in the relative tobacco area, as shown by **area replacement index.**

So far as **SAARC** countries are concerned, there is some replacement of tobacco by all the other crops taken together, as indicated by the **Aggregate Area Replacement Index.** Except in the case of Bhutan and India, in all other countries the aggregate area replacement index has registered a decline.

In the case of **Bangladesh,** there is a marginal increase in the Area Replacement Index, when area under pulses is considered. In the case of Bhutan, the Area Replacement Index has been found to have increased in respect of cereals, coarse grain, fruits, oil crops, pulses and vegetables, showing a dangerous trend of tobacco replacing most of the major food crops. Since, for curing tobacco, forest wood would be used, ***Bhutan taking to tobacco augurs ill for the environment and forest resources of the Himalayas***. In India the Area Replacement Index has significantly increased in the case of jute and jute like fiber crops, coarse grain and cereals. In the case of Nepal, also, though the aggregate area replacement index has declined, the index in the case of jute and jute like fibers and fiber crops has significantly increased. **These trends show that area under not only food crops but also under some of the important commercial crops (jute) are being replaced by tobacco.** Similar trends are witnessed in Pakistan also. In Sri Lanka, however, tobacco does not seem to have replaced any of these specified crops and the Area Replacement Index has actually declined showing that Sri Lankan farmers have not taken kindly to tobacco cultivation. Such aggregate figures, though may bring out broad trends about tobacco cultivation in the specified countries, **the detailed understanding about tobacco vis-a-vis other crops has to be developed only from micro level empirical studies.**

## IV. DETERMINANTS OF DECISION TO GROW OR SHIFT FROM TOBACCO:

An understanding of the determinants of tobacco cultivation would facilitate the control on tobacco cultivation. Why is it that farmers are taking to tobacco cultivation ? Which factors are likely to be effective in making farmers give up tobacco cultivation and taking up cultivation of other crops ? What is the economics of mixed crop cultivation with tobacco as one of the crops ? Which alternative economic activities in place of tobacco cultivation can be of interest to the farmers who are currently growing tobacco ?

All these questions of agricultural diversification are essentially empirical questions to be examined mainly with micro level data from the field.

**The decision to grow a particular crop is a highly individualized decision. It may depend upon the farmer's *'assessment'* about the quality of the soil, climatic conditions, availability of seeds, availability of the marketing facilities, cost of cultivation, availability of credit for meeting the cost, the size of holding, net return from cultivation of a particular crop etc. Farmer's *'perceptions'* about the above factors are likely to be more effective determinants of the decision.** For example; if in the judgment of a farmer the market is likely to be favourable for a particular crop then he would take a decision to grow that crop. Thus, the decision for cultivation of a particular crop is a highly individualized decision. That this is so is the reason for different crops being grown in the same village by different farmers in the same season. Demonstration effect might also operate in the choice of a particular crop, say tobacco. This decision might be just the result of tradition of tobacco cultivation inherited in the family from forefathers. In addition, in the case of tobacco the personal circumstances of the farmers may make them susceptible to the external influences. Thus, the tobacco farmers who are invariably under the debt trap may have to mould their decisions in accordance with the directives from the money lenders and commission agents. Such external influences may be powerful determinants of the farmer's decisions to cultivate tobacco. In this background, one can appreciate the importance of individual farmer-specific-approaches for moulding his decision-making for diversification away from tobacco and the policy interventions to check such external influences. ***The policy interventions targeted towards the farming community as a whole*** have to be considered as only additional support measures to help the decision of the farmers who choose to shift on the basis of their assessment of the gains from the alternatives.

In the following paragraphs, we have made an attempt to examine some of the questions listed above with the help of aggregate data for different countries. Analysis of the micro level data from the field follows this aggregate analysis.

## IV-A. A Multivariate Statistical Analysis of Tobacco Harvested Area : An International Perspective.

The question - Why do farmers take to tobacco cultivation can be restated as why is it that farmers decide to devote land area to tobacco cultivation. Observing the changes in the factors likely to be associated with tobacco cultivation one may develop insights about the ***tobacco area function*** in terms of these factors.

Farmers may decide to increase area under tobacco if good demand for tobacco is observed before the tobacco-sowing season. This demand may be both the domestic demand as well as the demand from other countries. High market price indicating high willingness to pay in view of large demand can be considered as one of the crucial determinants to grow tobacco on the available land area. Since tobacco does not require

much irrigation, like paddy or sugarcane, availability or otherwise of **irrigation facilities** may be considered as one of the determinants of area under tobacco. The experience of farmers with regard to the tobacco yield - ***production per hectare*** - in the previous harvest is also likely to influence this decision about whether tobacco should be sown in the land area or not. Tobacco is a highly labour-intensive crop. It is also generally observed that in order to avoid heavy labour costs of cultivation farmers normally depend upon cheap labour that is available within the family itself. Since female labour is cheaper than the male labour the **sex ratio** within the family may also determine the decision to cultivate tobacco in the land area available at the disposal of the farmer.

Since most of these variables, as perceived by the farmer, in the previous sowing or harvesting season, may determine the decision of the farmer to grow tobacco during the current year, these variables may be considered **with a time lag of**, say, one year. The government may promote tobacco cultivation if the country in question is required to **import tobacco**. Similarly, if the country is in a position to get foreign exchange earnings through **tobacco exports,** then incentives may be given to the farmers to use more land area to sow tobacco in order to grow more tobacco on the land holdings. These variables also can be considered with a lag of say, one year.

**Another crucial variable that is relevant in a study of the determinants of tobacco cultivation is obviously the subsidy given to the farmers.** In different countries, different subsidy regimes are observed. Irrigation subsidies, fertilizer subsidies, electricity subsides, subsidies on seeds and transportation, etc. are given to the farmers. In the case of tobacco farmers also, normally irrigation subsidies and fertilizer subsidies are given. In most countries, the government encourages scientific research in developing new and high yielding varieties of tobacco and the results of such researches are made available to the farmers in the form of subsidized quality seeds and saplings, more productive fertilizers etc. Unfortunately, detailed data about subsidies of the above types are not available for different countries. ***Hence, we were compelled to omit this relevant variable from our macro statistical exercises. In any case, since the effects of various types of subsidies on area under cultivation would be observed at the micro level of farmers, subsidy as a variable is considered under the micro level study using household level data.*** The results of a micro level exercise are reported in the subsequent sections.

Keeping in mind the broad logic as outlined in the previous paragraph, we developed a statistical analysis considering area under tobacco(in hectares)as a dependent variable with tobacco yield per hectare, irrigated area (1000 hectares), tobacco import value (1000 $), tobacco export value (1000 $), tobacco leaf import value (1000 $) and sex ratio as explanatory variables. Multiple linear regression function was developed for each of the major tobacco cultivating countries (for which data were available) using the data for the specified variables for the period 1980 to 97. Similar regression analysis was attempted also for each of the SAARC countries and also for the SAARC region as a whole using the data for the same period. As stated earlier, the independent variables were taken with a lag of one year.

These statistical exercises would be meaningful if we understand the logical

linkages of different variables used therein. ***The causality is not brought out by the regression analysis. The cause and effect relationship that is visualized through a logical analysis before hand would be either strengthened or disproved by the regression analysis.*** The underlying logic of causality for the regression exercises is already stated in the initial paragraphs of this section.

The statistical results - Beta coefficients for the independent variables and the $R^2$ values are presented in the following table.

**Table 6**
**Results of Regression Analysis to explain Area under Tobacco (Hect.) (Dependent Variable) (13 major tobacco countries) (1980-98)**

| | | | Beta Coefficients of explanatory variables of one year lag | | | | | |
|---|---|---|---|---|---|---|---|---|
| Country | R Square | Adjusted R Square | Tobacco Yield Per Hect. | Irrigated Area (1000 Hect.) | Tobacco imported value (1000 $) | Tobacco export value (1000 $) | Tobacco Leaf import Value (1000 $) | Sex Ratio |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| China | 0.932 | 0.891 | -0.459* | 0.651* | -0.233 | 0.017 | -0.016 | -0.255* |
| India | 0.572 | 0.316 | -0.545 | 2.757* | -1.632 | -0.143 | 0.730 | -1.984* |
| Argentina | 0.092 | -0.321 | -0.854 | 0.924 | 0.038 | -0.119 | 0.189 | - |
| Brazil | 0.292 | -0.132 | 0.072 | -5.081 | -3.578 | 0.164 | 2.378 | 6.107 |
| Greece | 0.775 | 0.641 | 0.178 | -0.012 | -0.489 | -0.636 | -0.075 | -0.338 |
| Turkey | 0.643 | 0.429 | -0.164 | 0.218 | 0.144 | -0.205 | -0.315 | 0.749* |
| USA | 0.860 | 0.776 | -0.016 | 0.529* | 0.980* | 0.716 | -0.644 | 1.828* |
| Italy | 0.757 | 0.611 | -0.134 | 0.447 | -0.350 | -0.178 | 0.227 | 0.650* |
| Zimbabwe | 0.885 | 0.816 | -0.307* | -0.126 | 11.051* | 0.511* | -11.168* | -0.658* |
| Peru | 0.541 | 0.266 | -0.623* | -1.073 | -0.412 | 0.213 | 0.266 | 1.462 |
| Indonesia | 0.254 | -0.193 | -0.236 | -3.955 | 5.298 | 1.256 | -2.719 | -0.444 |
| Malawi | 0.671 | 0.473 | -0.890 | -0.080 | 13.178 | -0.062 | -12.947 | -1.349 |
| Malaysia | 0.260 | -0.184 | 0.253 | 0.266 | -0.102 | -0.405 | 0.216 | 0.623 |

**Significant at 95 percent confidence level*

In the case of 9 out of 13 countries the model explains more than 50 percent of the variation in the area under tobacco. In the case of China, Zimbabwe, Italy, Greece, Malawi and Turkey, the explanation is more than 60 percent. In the case of China, Zimbabwe and USA around 90 percent of the variation is explained by the chosen variables.

In 6 out of 13 regression equations sex ratio was found to be statistically significant (at 95 percent confidence level). In 3 out of 13 equations tobacco yield of last year is found to be statistically significant. Tobacco import value was also statistically significant in two cases. Irrigated area, tobacco-export-value and tobacco leaf-import-value were found to be statistically significant in only one case. It is interesting that only in the case of Zimbabwe, except irrigated area, all the variables were found to be statistically significant.

Sex ratio had a negative sign in four out of seven cases. This variable was also statistically significant. This implies that as the female members dominate, the area under cultivation declines. This is interesting in the sense that instead of influencing the decision to bring more area under tobacco, the female members are likely to influence the farmers' decision to grow less tobacco. In respect of tobacco consumption also, it is generally observed that the female members are less prone to get addicted to smoking, chewing and snuffing tobacco than male members. Thus, **the female predominance in the family and the economy may act as a deterrent to tobacco cultivation.**

The coefficients for tobacco yield in all the three cases when the coefficient was significant, had a negative sign indicating **that if yield improves area under cultivation is likely to decline.** The value of the coefficient was also fairly high particularly in the case of Peru and in the case of China . Even in the case of the other countries where the coefficient was not significant, the tobacco yield had mostly a negative sign. In as many as 10 out of 13 cases the improvement in tobacco yield was found to reduce the area under tobacco cultivation. This is also brought out from the experiences of developed countries where yield and area are negatively associated.

Similar exercise was attempted in the case of SAARC countries also. The results of such a multivariate exercise are reported below :

**Table 7**
**Results of Regression Analysis to Explain**
**Area Under Tobacco (Hect.) (Dependent Variable) (SAARC Countries) (1980-98)**

| Country | R Square | Adjusted R Square | Beta Coefficients of explanatory variables of one year lag | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Tobacco Yield per Hect. | Irrigated Area (1000 Hect.) | Tobacco imported value (1000 $) | Tobacco export value (1000 $) | Tobacco Leaf import Value (1000 $) | Sex Ratio |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| India | 0.572 | 0.316 | -0.545 | 2.757* | -1.632 | -0.143 | 0.730 | -1.984* |
| Bangladesh | 0.891 | 0.832 | -0.267 | -0.691* | 0.500 | -0.054 | -0.745 | 0.710* |
| Bhutan | 0.849 | 0.786 | 0.101 | 1.702* | 0.140 | 0.000 | -0.043 | -1.737* |
| Pakistan | 0.309 | -0.069 | 0.000 | -0.808 | -0.512 | -0.445 | 0.034 | 1.046 |
| Sri Lanka | 0.795 | 0.683 | -0.479* | 1.014 | 0.724 | -0.016 | -1.234 | -0.795 |
| Overall SAARC | 0.916 | 0.910 | -0.189* | 0.656* | 0.016* | 0.329* | -0.166 | -0.035 |

**Significant at 95 percent confidence level*

In four out of five SAARC countries, chosen variables could explain more than 50 percent of variation in the area under tobacco. For the SAARC region as a whole, nearly 92 percent of the variation was explained by the selected variables. For Bangladesh, Bhutan and Sri Lanka about more than 80 percent of the variation could be explained by the specified variables. Only in the case of India the explanation was to the extent of 57 percent. Once again, **sex ratio was found to be quite an influential variable in the negative direction in 5 out of 6 cases** (including the SAARC region as one of the cases).

Tobacco leaf import had negative sign in the case of 4 out of 6 beta coefficients, none of which are, of course, statistically significant. The country-wise statistical analysis also shows that the irrigated area had statistically significant beta coefficient, in 3 out of 4 countries. This variable had a positive sign in majority of these cases, indicating that **as irrigated area expands tobacco area also is likely to expand. This might mean that farmers use irrigation facilities for tobacco cultivation itself. Does this imply that mere provision of irrigation facilities may not ensure shifting away from tobacco ?** What may be required is the positive initiative for persuading farmers to diversify agriculture away from tobacco. Interestingly, in no individual country case the tobacco export value had a statistically significant association with area under cultivation.

*The question of determinants of the decision to cultivate tobacco was pursued by rearrangement of different determinants identified for the purpose. In a revised specification we considered many of the variables which are more or less* ***directly relevant*** *to the tobacco cultivators.* For example, the tobacco yield for previous year, irrigated area, tobacco export value, sex ratio and tobacco price (producer's prices) as observed in the previous season were considered as determinants of the decision about the area for tobacco harvesting. Multiple linear regression equation was fitted with area under tobacco as a function of the above mentioned explanatory variables with one year lag. OLS method of estimating the coefficients was adopted. Two specifications were considered wherein, in one, tobacco price was considered and in another, percentage change in tobacco price was considered. The data covered the period of 1980 to 1995 for 13 major tobacco-producing countries of the world. The results are presented in the table below.

**Table 8**

**Results of Regression Analysis to explain Area Under Tobacco (Hect.) (Dependent Variable) (13 major tobacco countries) (1980-95)**

| | | | Beta Coefficients of explanatory variables of one year lag lag | | | | |
|---|---|---|---|---|---|---|---|
| Country | R Square | Adjusted R Square | Tobacco Yield per Hect. | Irrigated area (1000 Hect.) | Tobacco export value (1000 $) | Sex Ratio | Tobacco Price |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| China | 0.876 | 0.808 | 0.226 | 0.511 | -0.836 | -0.369 | 0.976* |
| India | 0.751 | 0.613 | 0.607 | 0.116 | 0.294 | -1.694* | 0.760 |
| Argentina | 0.613 | 0.398 | -0.344 | 1.605 | 1.139* | 1.199 | 0.182 |
| Brazil | 0.518 | 0.251 | -0.487 | 1.481 | 1.747 | -2.467 | 0.339 |
| Greece | 0.853 | 0.772 | 0.805* | -1.289* | -0.132 | -0.806* | -0.839 |
| Turkey | 0.806 | 0.698 | 0.039 | 1.286* | -0.192 | 0.593* | -1.070* |
| USA | 0.792 | 0.676 | -0.400 | 0.454 | 1.959 | 2.218 | -0.183 |
| Italy | 0.935 | 0.899 | 0.305* | -0.605* | -0.349 | 0.959* | -0.229 |
| Zimbabwe | 0.858 | 0.779 | 0.147 | 0.130 | -0.384 | -0.265 | 0.810 |
| Peru | 0.421 | 0.099 | 0.298 | -1.719 | 0.578 | 2.404 | 0.170 |
| Indonesia | 0.189 | -0.262 | 0.170 | 0.381 | -0.929 | -0.047 | 0.156 |
| Malawi | 0.694 | 0.524 | 0.212 | 0.693 | 0.756 | 0.559 | -0.121 |
| Malaysia | 0.438 | 0.125 | -0.454 | 0.319 | -1.303 | -1.423 | -0.861 |

*Note : * Significant at 95 percent level of Confidence.*

*Base data source : Food and Agriculture Organisation (FAO)*

**Table 9**

**Results of Regression Analysis to explain Area Under Tobacco (Hect.) (Dependent Variable)(13 major tobacco countires ) (1980-95)**

| | | | Beta Coefficients of explanatory variables of one year lag | | | | |
|---|---|---|---|---|---|---|---|
| Country | R Square | Adjusted R Square | Tobacco Yield per Hect. | Irrigated area (1000 Hect.) | Tobacco Export value (1000 $) | Sex Ratio | Tobacco Price % |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| China | 0.759 | 0.625 | 0.181 | -0.039 | 0.222 | -0.882* | -0.051 |
| India | 0.705 | 0.541 | 0.937 | -0.169 | 0.470 | -0.965 | -0.146 |
| Argentina | 0.680 | 0.501 | -0.028 | -2.120 | 1.547* | 0.352 | 1.139 |
| Brazil | 0.507 | 0.233 | -0.193 | -0.964 | 1.517 | 0.004 | 0.189 |
| Greece | 0.806 | 0.698 | 0.710 | -1.609 | -0.354 | -0.664 | 0.154 |
| Turkey | 0.547 | 0.296 | 0.153 | 0.541 | 0.202 | 0.178 | 0.186 |
| USA | 0.801 | 0.691 | -0.343 | 0.438 | 1.792* | 2.063* | 0.211 |
| Italy | 0.933 | 0.896 | 0.304* | -0.422 | - 0.561* | 0.881* | 0.196 |
| Zimbabwe | 0.872 | 0.801 | 0.244 | 0.056 | -0.184 | -0.755 | -0.349 |
| Peru | 0.406 | 0.077 | 0.995 | -1.729 | 1.427 | 2.098 | -0.389 |
| Indonesia | 0.195 | -0.253 | 0.175 | 0.419 | -0.909 | -0.178 | 0.117 |
| Malawi | 0.697 | 0.528 | 0.271 | 0.764 | 0.755* | 0.793 | -0.074 |
| Malaysia | 0.407 | 0.078 | -0.652 | -0.044 | -0.913 | -0.835 | 0.111 |

*Note : * Significant at 95 percent level of confidence*

*Base datasource : Food and Agriculture Organisation (FAO)*

The specification could explain in majority of the cases more than 50 percent of variation in area under tobacco. For major tobacco producing countries like Italy, Zimbabwe, Greece and USA more than 80 percent of variation in area could be explained by the chosen variables. In the case of China, India, Malawi and Argentina nearly 70 percent of the variation could be explained. Considering only those cases where the chosen variables could explain more than 50 percent variation in tobacco area, it is found that in 4 of 10 such cases tobacco export value had a statistically significant coefficient. In 3 of these 4 cases the coefficient was positive indicating that **the export value can act as a major incentive for expansion of area under cultivation.** In majority of the cases when the coefficient was statistically significant sex ratio had a positive sign implying that the **larger female representation might lead to larger area under tobacco. This is contrary to the previous result. The percentage change in tobacco price in the previous year did not have statistically significant association with area under cultivation.**

Considering the same specification with the data for SAARC countries it was noticed that the model could explain significantly large percentage of variation in tobacco area by the chosen variables. For Bangladesh, which had highest $R^2$ value of more than 96 percent, **irrigation was statistically significant having negative association with tobacco area. The level of tobacco price was also statistically significant and it had a positive association**. In Sri Lanka and India, sex ratio had a negative association in both types of specification indicating that **larger female population in the overall population might act as a dissuading factor for tobacco harvested area.**

From these statistical results it can be seen that in majority of the countries the above specification could explain significant amount of variation in the area under tobacco. Except in the case of Indonesia, Peru and Malaysia in all other cases $R^2$ was above 52 percent. For China, India, Greece, Turkey, USA, Italy and Zimbabwe $R^2$ was more than 70 percent. In the case of Malawi and Argentina it was more than 60 percent. In only 4 of the 13 cases tobacco yield of the previous season had a negative association with area under tobacco indicating **that improvement in yield does not necessarily lead to a reduction in the area in majority of the cases.** In majority of the cases, the coefficient of irrigation had a positive sign indicating that when **irrigation facilities are provided, area under tobacco may even expand.** In 7 out of 13 cases tobacco export value had a negative sign implying that **one cannot firmly conclude that exports earnings are likely to be a crucial inducement factor for tobacco cultivation.** In 7 out of 13 cases sex ratio had a negative sign implying that improvement in **sex ratio (higher number of female members in the family) may reduce area under tobacco. Tobacco price level also cannot be firmly considered to be having a positive association with area under tobacco,** since in 7 of 13 cases tobacco price had a positive sign while 6 cases had negative sign. Price elasticity of area are presented in the next sub section which may provide further insights about this issue. If we consider only the cases where $R^2$ is very high, [for example, in Italy, where $R^2$ is 94 percent], it is found that irrigation, export value and tobacco price had negative sign in explaining the area under tobacco cultivation. This shows that even **here the tobacco cultivation does not seem to depend upon the monetary returns associated with export and domestic tobacco price**.

Zimbabwe, which is supposed to earn significant amount of foreign exchange through tobacco trade, also reveals this aspect because the tobacco export value has a negative sign. For India, except sex ratio all variables have a positive sign. Since only broad insights can be developed from such statistical studies using aggregate country level data, we have considered only the signs of the coefficients of the independent variables for the purpose of drawing conclusions for the respective countries. **Such 13 regression studies to explain area under tobacco seem to show that more than the typical economic factors, it is the tradition of growing tobacco and sustained returns (and not necessarily high returns), which seem to determine the decision making for area under tobacco cultivation particularly in developing countries.**

*The statistical analysis for the purpose of understanding the determinants of tobacco cultivation was carried out further by deleting from the model those variables which were found to be having some what high inter-correlations.* After this exercise the main explanatory variables which could be retained in the model were irrigation, tobacco yield, tobacco export value and tobacco import value. These variables were used for explaining the area under tobacco in eight major tobacco producing countries and five SAARC countries separately. The results are presented in the following table :

**Table-10**
**Results of Regression Analysis to explain Area Under Tobacco (Hect.)**
**(Dependent Variable) (MajorTobacco Countries) (1980-95)**

| | | | **Beta Coefficients of explanatory variables of one year lag** | | | |
|---|---|---|---|---|---|---|
| Country | R Square | Adjusted R Square | Tobacco Import value | Tobacco Export Value | Tobacco Yield | Irrigation |
| 1 | 2 | 3 | 4 | | | |
| China | 0.116 | 0.057 | 0.340 | | | |
| Peru | 0.114 | -0.090 | -0.124 | -0.132 | | 0.285 |
| Zimbabwe | 0.356 | 0.264 | 0.404 | | 0.397 | |
| USA | 0.011 | -0.217 | -0.141 | | 0.061 | 0.089 |
| India | 0.267 | 0.098 | 0.261 | 0.261 | -0.496 | 0.163 |
| Italy | 0.437 | 0.357 | 0.465* | | -0.807* | |
| Malaysia | 0.170 | 0.051 | -0.352 | | -0.099 | |
| Argentina | 0.088 | -0.123 | 0.164 | | -0.883 | 0.909 |
| **SAARC Countries** | | | | | | |
| Bangladesh | 0.942 | 0.934 | | 0.050 | | -0.985* |
| Bhutan | 0.828 | 0.805 | | | 0.069 | 0.879* |
| Pakistan | 0.423 | 0.245 | 0.266 | 0.034 | 0.350 | 0.459 |
| Sri Lanka | 0.047 | | | | | -0.218 |
| India | 0.267 | 0.098 | 0.261 | 0.261 | -0.496 | 0.163 |

**Note : 1. Coefficients marked by * are statistically significant at 95 % confidence level**

2. Variables are chosen after ensuring that there is no multi-collinearity problem
3. Basic data about the variables for respective countries is derived from FAO

This revised specification could explain different percentages of the variation in the area under tobacco in terms of the specified variables. Better explanation was seen in the case of Italy, Zimbabwe and India, the explanatory value varying between 44 percent to 27 percent. In the case of Italy, for which the explanatory value was 44 percent the two variables relevant for the model viz., tobacco import value and tobacco yield, both had statistically significant coefficients. While with increase in tobacco yield the tobacco area was found to contract, with improvement in tobacco import value, tobacco area was found to expand. The latter result appears somewhat surprising, probably indicating that in order to control tobacco imports there is an implicit encouragement to expand area under tobacco in the interest of achieving self-reliance in respect of tobacco. In the case of Zimbabwe, the tobacco yield and tobacco import value had positive regression coefficients.

In the case of most of the SAARC countries, the explanatory value of the regression models was found to be fairly encouraging. The $R^2$ value varied between 27 percent in the case of India to 94 percent in the case of Bangladesh. In all these regression runs, except irrigation no other variable was found to be statistically significant. Interestingly, in the case of Bangladesh, irrigation was found to have a negative association with area under tobacco indicating that as irrigation facilities are provided farmers would divert their land holdings away from tobacco to other crops such as sugar or paddy requiring more irrigation. In the case of Bhutan however, the irrigation variable was found to have a positive regression coefficient, indicating that if irrigation facilities are provided then, more land holdings are likely to be brought under tobacco cultivation. ***This surely suggests that the irrigation facilities cannot be considered as a surer instrument for persuading farmers from tobacco to other crops.*** However, further insights about the nature of the relationships and validity of causality between different sets of variables can be developed only through micro level inquiries rather than such macro statistical studies using international data.

## IV. B. Price - Elasticity of Supply of Tobacco from macro data :

***From the above statistical results for major tobacco producing countries and also for the countries of the SAARC region we reach a general conclusion that tobacco cultivation is more a result of the tradition rather than the result of a calculated decision making by the farmers for the purpose of economic returns.*** This should not be taken to mean that economic factors do not play their role at all in such a decision making. We wanted to focus our attention on producer's price and export price as specific and direct inducement factors for the decision making of the farmers for tobacco cultivation. With this purpose in mind another set of statistical analyses was carried out for the same group of countries.

***What is the price elasticity of tobacco supply or of area under tobacco ?*** Some studies have shown that demand for tobacco products is highly price elastic (as observed

in the case of Zimbabwe, for example). Studies on price elasticity of supply of tobacco have not come to our notice. Since supply of tobacco is likely to depend upon area under tobacco we considered two double log specifications for estimating the price elasticity of supply using the macro data. Ideally, such elasticity coefficients should be worked out using the micro level data. This also is carried out in the subsequent sections of this paper.

Production of tobacco (in metric tons) of the current year was considered as a function of the export value per unit of tobacco export and the producer's price, both observed for the previous year. This regression equation was estimated with the help of OLS for the major tobacco producing countries and SAARC countries for which data were available.

Since area under tobacco is a major factor in determining production of tobacco and since decision of this is more directly relevant for the question of agricultural diversification away from tobacco, we considered area under tobacco as a function of the above two lagged price variables. This is the second specification.

The results of these two exercises are presented in the following tables.

**Table 11**
**Price Elasticity of Area Harvested of Tobacco**
**Results of Regression Analysis to explain Tobacco Harvested Area (Dependent Variable) (13 major tobacco countries) (1980-95)**

| | | | Beta Coefficients of explanatory variables of one year lag | |
|---|---|---|---|---|
| Country | R Square | Adjusted R Square | Export value Of tobacco / Tobacco Leaf exports | Producers' value |
| 1 | 2 | 3 | 4 | 5 |
| China | **0.667** | 0.612 | **0.102** | 0.726 |
| India | 0.195 | 0.061 | 0.015 | -0.449 |
| Argentina | 0.024 | -0.138 | -0.064 | -0.123 |
| Brazil | **0.533** | 0.430 | **0.807*** | -0.134 |
| Greece | **0.599** | 0.532 | **-0.785*** | 0.013 |
| Turkey | **0.509** | 0.427 | **-0.410** | 0.917* |
| USA | **0.626** | 0.563 | **-0.748** | 0.576* |
| Italy | 0.377 | 0.273 | 0.540* | -0.344 |
| Zimbabwe | **0.734** | 0.690 | **0.470*** | 0.576* |
| Peru | 0.057 | -0.132 | -0.015 | -0.235 |
| Indonesia | 0.228 | 0.099 | -0.629 | 0.735 |
| Malawi | 0.371 | 0.266 | 0.105 | 0.525 |
| Malaysia | 0.210 | 0.052 | -0.404 | -0.119 |

*Note : * Significant at 95 percent level of Confidence. Base data source : Food and Agriculture Organization (FAO)*

**Table 12**
**Price Elasticity of Supply – Tobacco Production**

**Results of Regression Analysis to explain Tobacco Production (Dependent Variable) (13 major tobacco countries ) (1980-95)**

| Country | R Square | Adjusted R Square | Beta Coefficients of explanatory variables of one year lag: Export value of tobacco / Tobacco leave exports | Beta Coefficients of explanatory variables of one year lag: Producers price value |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| China | **0.509** | 0.427 | **0.143** | 0.584 |
| India | 0.172 | 0.034 | -0.036 | 0.431 |
| Argentina | 0.133 | -0.012 | 0.301 | 0.130 |
| Brazil | **0.730** | 0.670 | **0.844** | 0.021 |
| Greece | 0.362 | 0.256 | -0.120 | 0.698 |
| Turkey | 0.352 | 0.244 | -0.487 | 0.793 |
| USA | 0.414 | 0.316 | -0.541 | 0.553 |
| Italy | 0.287 | 0.168 | 0.469 | -0.303 |
| Zimbabwe | **0.763** | 0.723 | **0.401** | 0.652 |
| Peru | 0.051 | -0.139 | 0.046 | -0.232 |
| Indonesia | 0.200 | 0.067 | 0.077 | 0.504 |
| Malawi | **0.831** | 0.803 | **0.270** | 0.689 |
| Malaysia | 0.103 | -0.076 | 0.093 | 0.341 |

*Note : Base data source : Food and Agriculture Organization (FAO)*

From the above tables we notice that in six of 13 cases the $R^2$ value is above 50 percent so far as area under tobacco is concerned. So far as tobacco production as a dependent variable is concerned, the $R^2$ value is above 50 percent only in the case of 4 out of 13 countries. We propose to interpret the results of only those cases for which the $R^2$ value is above 50 percent. The following table summarizes the results of this exercise relating to price elasticity of supply.

**Table 13**

| Sign of the coefficient of price elasticity of supply | Countries: Export price | Countries: Producer's price |
|---|---|---|
| **A. Price elasticity of supply is positive** | | |
| i. Area under tobacco | China<br>Brazil*<br>Zimbabwe*<br>USA* | China<br>Greece<br>Turkey* |
| ii. Tobacco production | China<br>Brazil<br>Zimbabwe<br>Malawi | China<br>Brazil<br>Zimbabwe<br>Malawi |
| **B. Price elasticity of supply is negative** | | |

| | | |
|---|---|---|
| Area under tobacco | Greece*<br>Turkey | Brazil<br>USA |
| Tobacco production | -Nil- | -Nil- |

** Marked cases indicate statistically significant β coefficients (at 95% confidence level)*

**In majority of the cases, price elasticity of supply is positive indicating the normal behaviour of tobacco supply function. This shows that tobacco farmers do respond to price factor.**

**Majority of the results indicates that internal producers' price and export price do play an important role in supply decision especially about area under tobacco. This aspect needs to be kept in mind in designing any policy for agricultural diversification away from tobacco.**

## V. ECONOMIC ASPECTS OF TOBACCO CULTIVATION IN INDIA : MICRO LEVEL INSIGHTS FOR TOBACCO SHIFTING :

In order to develop a closer understanding of the economics of shifting from tobacco, we undertook a micro level study[3] relating to one of the major tobacco producing countries, viz. India. In the following paragraphs, a brief outline is presented about the experiences from this basic-cum-action research project particularly from the point of view of diversification of agriculture. The discussion relates to the following **four major themes : a)Determinants of tobacco cultivation, b)Price elasticity of tobacco supply using micro data, c)Agricultural output function for different crops, highlighting the distinguishing features of tobacco as compared to other crops and mixed cropping pattern as a strategy for agricultural diversification and d)Other major socio-economic aspects of tobacco cultivation as derived from household level data.** In the case of the latter, results of two studies, including CMDR study, are presented.

## V-A. Determinants of Tobacco Cultivation : Analysis of household level data in selected villages in India

[3] ***Economics of Shifting from Tobacco : An Action cum Basic Research study*** (sponsored by International Development Research Centre (IDRC), Canada) undertaken by this author in the Centre for Multi-disciplinary Development Research, Dharwad, Karnataka, INDIA.

From our above mentioned study of tobacco (bidi tobacco) farming in 50 villages of the tobacco region of southern part of India, interesting insights could be developed about the determinants of tobacco cultivation.

Area under tobacco was considered as a function of man days available for the tobacco farming household, per capita income, tobacco price, irrigation facilities and fertilizer subsidies, all relating to the previous year. Similar set of variables were used to explain tobacco production. Also, tobacco yield was considered as a function of the same set of variables. Thus, tobacco area, tobacco production and tobacco yield were considered as dependent variables in the statistical exercises. The data pertain to 1652 tobacco farmers of Karnataka surveyed under the micro level study referred to above. Since double log specification was adopted we get the elasticity coefficients in beta coefficients. The results of such exercises using multi-variate statistical techniques (OLS) are presented below.

**Table-14**
**Regression results to explain select tobacco related variables for 1652 Tobacco Producing farmers in Karnataka – India with Double Log specification**

| Dependent Variable | R Square | Adj.R Square | Explanatory Variable | Beta Coefficient |
|---|---|---|---|---|
| **Tobacco Area** | 0.556 | 0.553 | Tobacco Man days | 0.146* |
| | | | Per Capita Income | 0.000 |
| | | | Tobacco Price | -0.018 |
| | | | Irrigation | 0.206* |
| | | | Fertilizer Subsidy | 0.605* |
| **Tobacco Production** | 0.528 | 0.526 | Irrigation | 0.206* |
| | | | Per Capita Income | 0.017 |
| | | | Tobacco Man days | 0.120* |
| | | | Fertilizer Subsidy | 0.557* |
| | | | Tobacco Price | 0.110* |
| **Tobacco Yield** | 0.082 | 0.076 | Irrigation | 0.067 |
| | | | Per Capita Income | 0.028 |
| | | | Tobacco Man days | 0.006 |
| | | | Fertilizer Subsidy | 0.123* |
| | | | Tobacco Price | 0.201* |

*

Note : i) Subsidy amount was estimated by considering the rate of subsidy and quantity of fertilizer used. Only fertilizer subsidy is considered in the statistical exercise ii) Different crops attract water charges at different rates according to source of irrigation. For example in Karanataka such charges are levied at Rs. 450 per acre on sugarcane whereas for tobacco, the rate is Rs. 48 per acre only. In view of the complex methodological issues involved in determining water rates and water subsidies, we have not considered water subsidy in the statistical exercizes. Similarly, the power subsidy and other types of subsidies are not considered because of non availability of data.

Note : Tobacco area : in acre, Per capita Income –in Rupees, Tobacco Price – in Rupees, Irrigation charges – in Rupees, Fertilizers subsidy – in Rupees, Tobacco man days – in numbers.

The model could explain 8 percent of variation (as in the case of yield) to 56 percent of the variation (as in the case of tobacco area). Since $R^2$ was 53 percent to 56 percent in the case of tobacco production and tobacco area as dependent variables we may interpret the results of these two models for the purpose of policy making. It was found that the tobacco area was positively elastic with respect to the explanatory variables viz., man days used (indicating labour use) irrigation facilities used and fertilizer subsidy enjoyed by the farmers indicating the advantages available to the farmers in the process of tobacco cultivation. Tobacco price was not found to be statistically significant. It should be mentioned that Bidi tobacco is not enjoying administered price like FCV tobacco. Hence, the price variable is determined by the forces of bidding in the market, though in view of the higher strength the traders have a better bidding power than the tobacco farmers.

***From the regression coefficients it can be noticed that the area under tobacco and production are more sensitive to fertilizer subsidy rather than irrigation rather than fertilizer subsidy***. These results may indicate that the farmers tend to decide to bring land under tobacco if they expect to receive subsidy of different types. They may tend to put in more effort to produce tobacco if they expect to get good price for tobacco, as the coefficient for price is positive and statistically significant in the case of the model with tobacco production as dependent variable. All the chosen variables in this model have statistically significant regression coefficients except per capita income. It is also worth noting that provision of irrigation does not induce farmers to shift from tobacco to other crops requiring more irrigation. ***It appears that the farmers tend to use irrigation facilities for tobacco cultivation itself***. This is an important finding relevant for policy making as learnt from the micro level study. This micro level result seems to be consistent with some of the results from the macro level statistical exercise outlined in the previous section (IV A).

## V-B. Price elasticity of tobacco : Estimates from micro level data :

It can also be seen that ***price elasticity of tobacco area and also tobacco production are positive***. ***The price elasticity of tobacco production is much higher than the price elasticity of tobacco area***. These results are quite meaningful and they are consistent with the results from the macro level exercise presented earlier (section IV B).

That the price elasticity of tobacco supply (as indicated by area under tobacco and production of tobacco) is positive, is brought out from our another statistical exercise also, relating tobacco area only with tobacco price and tobacco production only with tobacco price, separately in a double log specification. The coefficient of determination ($R^2$) varied between 8 percent to 19 percent when tobacco production and tobacco area respectively were considered as dependent variables. The elasticity coefficients were found to be statistically significant. The following table summarizes the results of this exercise of calculating price elasticity of supply in the case of tobacco.

**Table –15**

**Price Elasticity of Supply of Tobacco**

| Supply indicator | Coefficient |
|---|---|
| Area under tobacco | 0.137* |
| Tobacco Production | 0.284* |

*****Statistically significant

**V-C. Agricultural Output Function for Tobacco and other crops**

The question of determinants of tobacco production was pursued further under this micro level exercise, using information about many aspects of tobacco farmers, particularly about their personal circumstances and data about different types of input variables. This may be termed as an exercise for estimation of a tobacco output function. Similar output functions were estimated for other crops as well with a purpose to explore whether tobacco has any specific advantages as compared to other crops and whether tobacco farmers aim at exploiting these specific advantages. With this purpose in mind, the output functions for thirteen agricultural crops were estimated. The explanatory variables chosen for the purpose were - land holdings of the farmers, percentage of irrigated area to cultivated area, economic status of the farmers reflecting their asset and income position, expenditure on fertilizers and pesticides used per unit of production, expenditure on seeds, expenditure on other non-labour items, human days input in cultivation, animal days input in cultivation and years of schooling of the head of the household. In order to estimate the elasticity of output with respect to these explanatory variables double log specification was adopted and the regression coefficients were estimated by using OLS methods. The results of such an exercise are presented in the following table.

## Crop - wise Regression Results ( Double Log Regression Equation )

**( Dependent variable - Ln of Output )**

**Equation : Output = f ( Land,Irr,Human Labour,Bullock labour,Economic Status, Fertilisers & Pesticides per unit of production ,Education,Seeds,Other Expenditures )**

| Crops | Constant | Coefficient Values | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Land ( acres ) | % of Irr. Area to Cult. area | Ecosta ( Rs. ) | Fert & Pest per Unit of production (Rs.) | Seeds ( Rs. ) | Other Expenses ( Rs. ) | Human days | Animal Power ( bullock days ) | Sch.Yrs of the HH | R square | Return to scale |
| TOBACCO | 1.82* | 0.66* | 0.010 | 0.14* | -0.41* | 0.006 | 0.05* | 0.075* | 0.084* | 0.013 | 0.76* | 0.63 |
| CHILLY | -2.76* | 0.39* | 0.02 | 0.14* | -0.14* | 0.13* | 0.050* | 0.11 | 0.29* | -0.043 | 0.43* | 0.95 |
| SUGARCANE | 0.66* | 0.62* | 0.068* | 0.14* | -0.28* | 0.09* | 0.079* | 0.10* | 0.042 | 0.003 | 0.72* | 0.86 |
| COTTON | -1.24* | 0.42* | 0.01 | 0.17* | -0.17* | 0.18* | 0.020 | 0.017 | 0.11 | 0.036 | 0.55* | 0.79 |
| SOYABEAN | -0.37 | 0.77* | -0.009 | 0.16* | -0.068* | 0.013 | 0.006 | 0.006 | -0.025 | 0.027 | 0.58* | 0.88 |
| WHEAT(KH) | -0.98 | 0.59* | -0.15* | 0.14* | -0.11* | 0.39* | -0.0004 | -0.041 | -0.14 | 0.034 | 0.62* | 0.71 |
| WHEAT(R&S) | -1.18 | 0.40* | 0.05 | 0.14* | 0.016 | 0.046 | 0.04 | -0.04 | 0.22* | 0.002 | 0.29* | 0.87 |
| PULSES(KH) | -0.315 | 0.65* | 0.064 | 0.02 | 0.010 | -0.04 | 0.09* | 0.12 | 0.11 | -0.12 | 0.50* | 0.9 |
| PULSES(R&S) | -0.99 | 0.65* | 0.004 | 0.15* | -0.08 | 0.06 | 0.03 | -0.07 | -0.11 | 0.07 | 0.51* | 0.7 |
| JOWAR(KH) | 0.052 | 0.52* | -0.006 | 0.13* | -0.13* | 0.11* | 0.01 | 0.063 | 0.006 | 0.003 | 0.51* | 0.71 |
| JOWAR(R&S) | -0.46 | 0.68* | 0.007 | 0.13* | -0.051* | 0.035 | 0.010 | 0.12* | 0.070 | 0.015 | 0.61* | 1.02 |
| GROUNDNUT | -0.27 | 0.57* | -0.021 | 0.10* | -0.051* | 0.022 | 0.038* | -0.02 | 0.013 | 0.017 | 0.48* | 0.67 |
| PADDY | 1.18 | 0.49* | 0.16* | -0.021 | -0.17* | 0.086 | 0.033 | 0.10 | -0.059 | 0.088 | 0.37* | 0.71 |

Note: * Significant at 5% level of significance

The regression model for each of the thirteen crops has different explanatory values varying between 29 percent to 76 percent. For Tobacco the model could explain 76 percent of the variation in output. The last column in the above table gives estimates of returns to scale derived from the results of regression analysis.

It can be seen that in the case of most of the crops output varies directly with many of the specified explanatory variables. For fertilizers and pesticides the regression coefficient has a negative value in the case of most of the crops. This implies that ***farmer tend to over use fertilizers and pesticides disregarding its effect on the soil quality and its consequent adverse effects on output.*** In the case of six out of nine specified explanatory variables the regression coefficients are statistically significant for tobacco. It was noticed that the **significant factors influencing tobacco output are size of the land holding, percentage of irrigated area, literacy rate and the related factors**. It was noticed that tobacco is affected positively by the size of the land holding. Literacy level of the farmers is negatively associated with tobacco output**. This shows that if the farmers receive proper education and if they are suitably sensitized about the adverse effects of tobacco then they may trend to reduce tobacco output. Interaction with farmers in the selected villages also showed that farmers may be encouraged initially to grow tobacco with sugarcane where irrigation is available**

**and tobacco with soybean where irrigation is not available. If full shifting is recommended, then the combination of sugarcane with soybean in the situation where irrigation facilities are available, soybean with groundnut where irrigation facilities are not available, may be accepted as alternatives to tobacco cultivation.** *We must hasten to add that this is the experience of farming practices in one of the tobacco regions of India. Similar studies for other regions would be necessary in order to make firm recommendations based upon the situation specific data relating to these regions.*

**V-D. Other Major Socio Economic Aspects of Tobacco Cultivation**

The micro level study referred to above collected information about different aspects relating to 1652 tobacco cultivating families in the bidi tobacco region of northern part of Karnataka state of India. The analysis of these data reveals the following:

i) Richer farmers tend to prefer tobacco to other crops,

ii) Small farmers take to tobacco cultivation as something inevitable in the absence of a suitable alternative.

iii) Tobacco uses maximum quantity of human and bullock labour amongst all the other crops of the region,

iv) Cost of cultivation for tobacco is much higher than for other crops,

v) Marginal farmers in particular, face the pinch of this high cost more severely than others. However, since the gross returns from tobacco are much higher than in the case of other crops, farmers are carried away by this high gross return. This therefore camouflages the high cost of cultivation of tobacco. The farmers normally do not capture the full economic implications - both costs and returns - of tobacco cultivation. ***The net return from tobacco is lower, in fact, than that for many of the other crops. Sugarcane fetches even higher net return than tobacco.*** However, the sugarcane cultivation requires heavy irrigation facilities regarding which special initiatives have to be taken by the policy makers. These micro level results are surely quite meaningful for agricultural diversification away from tobacco.

vi) Economies of scale for tobacco cultivation are not very favourable in comparison with other corps. (please refer to the last column in the table given in the previous section)

vii) Tobacco cultivating households experience many other unfavourable effects from tobacco cultivation, tobacco storing at home, and tobacco curing in the sun, or through wood fuel near their houses, etc.

   a) Frequent spray of fertilizers and insecticides required for tobacco is found to be causing respiratory ailments for farmers. Smell of stored tobacco bags (bodh's) is found to spoil cooked food. Plucking of leaves, frequent touching of leaves, etc., are found to cause skin irritation and skin diseases. (Please see the Appendix Photograph-9)

   b) Aroma of tobacco due to storing and sun curing and wood fuel smoke due to fuel curing of tobacco have been found to cause

respiratory problems for children and women, in particular, of the tobacco cultivating families.

viii) use of children of school going age, in tobacco agricultural operations have kept them away from schooling (Appendix Photograph –8)

ix) Tobacco marketing has been a major problem and middlemen have been exploiting farmers.

x) The farmers also recognized that long period of time required for tobacco (nearly 6 months) as compared to other crops (say 3 to 4 months) is a negative aspect of tobacco cultivation.

Discussion with farmers showed that farmers are quite vexed of tobacco agriculture and are willing and keen to shift to other crops or other activities if suitable alternatives are shown to them. Mixed cropping and other activities like dairy farming, are sometimes suggested by the tobacco farmers as alternatives to tobacco cultivation. The alternative of mixed cropping was examined further as an initial step to shifting from tobacco cultivation. In the next section two such experiences are briefly documented in order to develop practical insights for policy making.

## VI. ECONOMICS OF INTER-CROPPING SYSTEM AS AN APPROACH TO AGRICULTURAL DIVERSIFICATION

Field experiements[4] conducted in inter-cropping system at Central Tobacco Research Institute (CTRI), Research Station, Pusa, Bihar, India, from 1990 to 1997 revealed that **tobacco plus garlic** inter-cropping system recorded **maximum total yield of** 2485 Kg, and first grade out turn of 1725 Kg. giving net return of Rs.83851 per hectare. The cost benefit ratio or return per unit of investment was estimated at 1 : 3.17. Other crop combinations recommended are **tobacco and rajmash** (net return of Rs.68700) and tobacco plus potato (net return of Rs.67974). **Such inter-crop systems may be the first step of gradually moving away from tobacco.** From amongst the **non-tobacco mixed cropping systems, maize plus potato was estimated to fetch the net return of Rs.35854 per hectare.** Considering the aversion to calculated risk associated with alternative cropping systems **garlic and potato** were considered as suitable because both of them remain under ground escaping the risk of loss due to hail storm, pests etc. which normally affect tobacco neutralizing completely the investments made by the tobacco farmers. The following table presents the indicators of economics of different inter cropping systems as reported from this CTRI experiment.

[4] K.D.Singh et al. 'Studies on Feasibility and Economic Viability of Tobacco Based Inter-cropping System in Bihar' *Tobacco Research 24 (2)* 1998

**Table 17**
**Economics of different inter-cropping systems**

| Treatment | Cost of Cultivation Rs/ha) | Gross Return (Rs./ha) | Net return (Rs./ha) | C.B.Ratio |
|---|---|---|---|---|
| Tobacco alone | 23221 | 80637 | 57416 | 1:2.47 |
| Tobacco + garlic | 26471 | 110322 | 83851 | 1:3.17 |
| Tobacco + rajmash | 24024 | 92724 | 68700 | 1:2.86 |
| Tobacco + maize | 25136 | 86528 | 61393 | 1:2.44 |
| Tobacco + cauliflower | 25720 | 87873 | 62154 | 1:2.42 |
| Tobacco + potato | 28494 | 96468 | 67974 | 1:2.39 |
| Tobacco + blackumin | 23799 | 78448 | 54649 | 1:2.30 |
| Tobacco + fenugreek | 23861 | 86713 | 62852 | 1:2.63 |
| Tobacco + coriander | 23825 | 82923 | 59097 | 1:2.48 |
| Maize + patato | 13912 | 49769 | 35854 | 1:2.58 |
| **Mean market rate / selling price (Rs./q)** | | | | |
| Tobacco | 3130 | | Potato | 150 |
| Garlic | 1167 | | Blackumin | 1833 |
| Rajmash | 1267 | | Fenugreek | 1833 |
| Maize | 333 | | Coriander | 1400 |
| Cauliflower | 167 | | | |

In the background of the experimental exercise, we examined this issue with the help of the household level data in one of the tobacco growing regions of southern part of India through a study[5] referred to above. On the basis of the household survey of 2000 households in the region interesting results have emerged. Out of 2000 households 1652 households were engaged in tobacco cultivation. 162 households were mixed croppers. 144 were mixed croppers with tobacco. The following table presents the salient indicators of economics of mixed cultivation in the region as revealed from the field study.

[5] ***Economics of Shifting from Tobacco Cultivation.*** Centre for Multi-disciplinary Development Research, Dharwad, Karnataka, India. An ongoing action research project sponsored by **International Development Research Centre (IDRC), Canada.**

**Table 18**
**Salient Indicators of Mixed Cultivation**

| Combination of Crops | Per acre Production (Rs.) | Cost of cultivation (Rs.) | Per acre cost of cultivation. (Rs.) | Net return per acre (Rs.) |
|---|---|---|---|---|
| Tobacco (K) + Jowar (K) | 12429.96 | 1511602.00 | 6107.73 | 6322.23 |
| Tobacco (K) + Jowar (R) | 7606.38 | 605932.00 | 3775.28 | 3831.11 |
| Jowar (K) + Tobacco (R) | 13302.51 | 40782.00 | 4078.20 | 9224.31 |
| Tobacco(K)+Groundnut(K) | 8695.82 | 99000.00 | 7746.48 | 949.34 |
| Tobacco(K)+Groundnut(R) | 15470.00 | 16270.00 | 8135.00 | 7335.00 |
| Tobacco (K) + Sugarcane (K) | 6300.00 | 27750.00 | 2775.00 | 1.27 |
| Tobacco (K) + Chilly (K) | 6588.57 | 30656.00 | 17465.71 | -10877.14 |
| Tobacco (S) + Jowar (S) | 3169.47 | 21490.00 | 5372.50 | -2203.03 |
| Groundnut(K)+Tobacco(K)+Paddy(K) | 2112.50 | 8610.00 | 4305.00 | -2192.50 |
| Groundnut(K)+Jowar(R) | 4200.00 | 9825.00 | 2807.14 | 1392.86 |
| Groundnut(K)+Jowar(K) | 3106.33 | 11570.00 | 2728.77 | 377.55 |
| Groundnut(K)+Cotton(K) | 1.41 | 10800.00 | 9.00 | 5320.00 |
| Pulses(K)+Wheat(K) | 1.76 | 9413.00 | 9.91 | -8741.59 |
| Soybean(K)+Groundnut(K) | 1992.56 | 12850.00 | 1906.53 | 86.03 |
| Paddy(K)+Jowar(K) | 995.99 | 3305.50 | 1652.50 | -656.51 |
| Groundnut (K)+Chilly(K) | 2821.42 | 5991.00 | 4792.80 | -1971.38 |
| Soybean(K)+Chilly(K) | 3089.74 | 1145.00 | 2290.00 | 799.74 |
| Jowar(K)+Chilly(K) | 1901.16 | 1315.00 | 2630.00 | -728.84 |
| Groundnut (K)+Pulses(K) | 690.00 | 3190.00 | 1595.00 | -905.00 |
| Groundnut(K)+Soybean(K)+Pulses(K) | 8.58 | 13800.00 | 0.00 | -3469.68 |

*Source : CMDR Field Survey*

*K= Khariff Season - Mansoon. June to September*
*R = Rabi Season - October to Jan or so.*
Data Source : CMDR Household Survey of tobacco farmers

It can be seen from above that ***mixed cropping is much more profitable than exclusively tobacco cropping. Jowar (kharif) and tobacco (rabi) combination fetches larger net return per acre than other mixed cropping practices.*** It is also noticed that per acre cost of cultivation in the case of mixed cropping of tobacco and jowar is very low. It is worth noting that the net return per acre is positive and fairly high when tobacco is cultivated along with jowar and groundnut (rabi). ***From this one can observe that in case farmers have to gradually shift from tobacco then they must be persuaded to take to mixed cropping with tobacco initially and then move to other crops or other economic activities in place of tobacco cultivation.*** This is necessary because tobacco is a major source of livelihood for the farmers in the tobacco belts of the country and asking farmers to shift from tobacco without any alternative proposals would not be advisable and feasible. A number of suicidal deaths of the farmers were reported in recent years from different parts of the country in view of the crop failures. Hence, **a package of mixed cropping, shift to other crops with a suitable crop insurance facilities, adequate farm inputs for the alternative crops, adequate marketing facilities etc., would be necessary in order to ensure the success of this policy of gradual shift from tobacco.**

## VII. IMPLICATIONS OF DIVERSIFICATION OF AGRICULTURE AWAY FROM TOBACCO.

If currently tobacco cultivating households have no alternative to tobacco cultivation, then their shifting from tobacco would obviously disturb the economic condition of such families. The shift from tobacco would also have chain implications for all the economic entities upto the consumers in the forward linkage framework and upto the units supplying seeds & fertilizers, etc. and other entities in the backward linkage framework. Large number of trading units marketing tobacco products heavily depend upon tobacco as a major raw material. Obviously, the economy of the households involved in these operations would be affected as a result of farmers' shifting away from tobacco. The petty vendors who have subsistence income from the sale of the tobacco products like snuff, chewing tobacco, bidis, cigarettes etc. need to be rehabilitated if they are displaced from agricultural diversification. Units supplying tobacco seeds, fertilizer and pesticide producing units supplying these to tobacco-farmers etc., may find their economic condition affected once the farmers shift away from tobacco. Obviously such units may have to supply fertilizers & pesticides and seeds as required for the alternative crops. Such switching may be costly. **A scientific study of the direct and indirect effects of diversification from agriculture away from tobacco can be attempted if tobacco is shown as one of the industries in the inter-industry transaction matrix** and the final demand vector. Unfortunately, such detailed data are not available for many developing countries to facilitate a detailed analysis.

Lack of tobacco supply to the consumers may have its own **implications in terms of labour productivity, efficiency in performance, health, stress in workplace etc. On these aspects very few scientific empirical studies are available,** though, one may make a safe conjecture that the net effects on the consumer from agricultural diversification away from tobacco would be positive and large.

It is sometimes argued that tobacco and tobacco products are major sources of indirect tax revenue for the government and agricultural diversification away from tobacco may possibly reduce this revenue. It should however be emphasized that the **net effects would be still favourable to the government because, the government expenditures for health and medical care, necessitated by tobacco health hazards, would be considerably reduced.**

Agricultural diversification away from tobacco is **alleged to cause loss of employment opportunities within the farm sector,** for, tobacco cultivation is supposed to require large number of workers throughout. While it is true that tobacco cultivation is labour intensive it should also be conceded that **shifting from tobacco may not cause too much of dislocation in the employment situation of the country in the ultimate analysis.** In India only about 5.6% of 107.14 million of total cultivators are engaged in tobacco farming. Since large number of farmers who have already shifted from tobacco cultivation, do not seem to have been unfavourably affected by their shifting **the adverse employment effect of shifting from tobacco is unnecessarily exaggerated.** Favourable effects in terms of avoidance of ill health, **promotion of schooling of children,** etc., would obviously outweigh the alleged adverse employment effects of shifting.

**Why do some farmers not cultivate tobacco ?**

For developing further insights for shifting, it may be useful to consider the factors responsible for not cultivating tobacco in the so called tobacco region itself. In the course of our micro level study on economics of tobacco shifting, we had contacted non tobacco growers also in the tobacco region of Karnataka. Though the number of such farmers is very small, (74 farmers), their responses about reasons for not cultivating tobacco are interesting. The following table summarizes the responses.

**Table-19**
**Reason for not Cultivating Tobacco**

| Reasons | Percentage of Farmers |
|---|---|
| a)Labour Problem | 10.8 |
| b)High cost of cultivation | 25.7 |
| c)Risk involved | 2.7 |
| d)Low Price of Tobacco | 1.3 |
| e)Irrigation is available (facilitating other crop cultivation) | 36.9 |
| f)Disease of Tobacco plant | 2.7 |
| g)Maintenance plant is time consuming and costly | 2.7 |
| h)Others | 17.6 |

This shows that majority of such farmers are convinced about the economic hazards of tobacco cultivation. This message, however, needs to be reached to all the tobacco cultivating farmers. It should also be added that more detailed studies of these aspects need to be initiated to derive further insights useful for policy.

## VIII. MEASURES FOR IMPLEMENTATION OF AGRICULTURAL DIVERSIFICATION

From the above analysis it can be seen that agricultural diversification away from tobacco may invite some resentment at least in the initial stages of shifting from tobacco. Any deviation from the current practices may cause some dislocation in the beginning. If suitable countervailing measures are taken then the costs of dislocations can be minimised. Shifting from tobacco would affect, as stated above, the economic conditions of several players connected with tobacco cultivation & supply and tobacco consumption. The policy measures for controlling tobacco industry have to be carefully designed and also more importantly, carefully but firmly implemented**. The lukewarm initiative on the part of the governments** of many tobacco producing countries towards tobacco control programme **may be considered as one of the major stumbling blocks** which needs to be removed from the path of effective implementation of tobacco control measures**. Just as the farmers are suffering from 'defective telescopic faculty', in view of their consideration of the gross return from tobacco cultivation, the governments also seem to be suffering from such a defective telescopic faculty**

**because they do not consider the revenue loss involved in providing for health care facilities due to tobacco related health hazards**. They consider only the excise revenue gain and also the customs revenue gains on account of tobacco cultivation, production of tobacco products and their exports. The governments in these countries need to be educated about the net loss that the country incurs on account of tobacco cultivation and production of tobacco products. ***In appreciation of these losses the government has to forthwith stop all assistance for the purpose of improving tobacco seeds, improving tobacco cultivation practices etc.*** In fact, in these countries governments spend huge sums of money for tobacco agricultural research and tobacco promotion. Similarly, ***bank assistance to tobacco farming and tobacco related activities should also be stopped***.[*]

The second major component of the measures of tobacco control relates to ***educating the farmers about the losses*** involved in the case of cultivation of this so-called commercial crop. The farmers who are aware of the losses are not in a position to shift because of lack of understanding of the alternative crops to be grown and/or alternative economic activities to be undertaken to maintain their economic position. ***Suitable guidance about the alternatives*** can be considered as a very rewarding measure for the purpose of ensuring sustained shift from tobacco.

The tobacco farmers are also fully aware of the ***difficulties of marketing of tobacco.*** In fact, as stated earlier, they are under the stranglehold of the trading agents or middlemen who keep on supplying credit to the farmers and procure the entire produce at very low rates and sell the produce with significant profit margin. In order to ensure sustained shifting from tobacco, measures have to be taken to eliminate the debt burden of the tobacco farmers and take them away from debt trap of these middlemen / traders. It is also necessary to provide suitable financial assistance to the farmers for undertaking alternative cropping or alternative activities.

Another important measure for assisting the shifters is to ***provide crop insurance against crop failures and crop insurance against the undue price fluctuations in the case of alternative crops.*** In many countries while tobacco is included in the scheme of crop insurance many alternative crops (particularly many of the food crops) are not. This creates an anomalous situation for those farmers who are interested in diversifying their agriculture.

From our micro level study, in southern India, referred to above, we noticed that some farmers are interested in altogether different economic activities in place of tobacco cultivation. **They considered dairy farming as an alternative economic activity.** The initial investment in the case of diary farming for the purchase of milch animals, construction of buffalo sheds purchase of milk cans and storage facilities, transportation facilities for transporting milk to the milk cooperatives, use of the excess milk for producing milk products through the utilization of specific equipment, etc., and also recurring expenditure on cattle feed also would be quite large, which, the farmers

[*] It is noticed that even the world bodies like IMF and World Bank have inadvertently supported tobacco cultivation during some years in the past through their assistance to tobacco producing countries. Obviously, such assistance should be stopped forthwith.

normally cannot afford. In this background, suitable assistance to the farmers on liberal terms seems to be necessary. It is also necessary to ensure that this assistance is utilized for the purpose of shifting from tobacco to the specified activities and not for the purpose of consumption, festivals, marriages etc.

**The most important measure for effecting diversification of agriculture away from tobacco would be obviously the control of demand for tobacco and tobacco products.** This can be ensured only by suitable health education to the consumers, rehabilitation of the tobacco addicts, psychological advice to the tobacco users who use tobacco as stress relieving agent and similar measures.

***Agricultural diversification away from tobacco can be considered only as a long term measure for tobacco control.*** As the recent World Bank study[6] suggests control of demand is a much surer method of tobacco control rather than control of supply. In the developed countries like US the tobacco consumption is declining, though tobacco production is not declining at the same rate. In this background of prospective exports of tobacco and tobacco products from the developed countries to the developing countries, mere agricultural diversification away from tobacco in the latter, may only lead to increased tobacco imports from the developed countries. ***The policy makers have to take necessary steps to restrict tobacco imports*** in these countries. Such restrictions would be necessary even for ensuring success of farmers' initiatives to shift away from tobacco cultivation. In the WTO regime such import restrictions should be considered permissible for exceptional reasons. The tobacco farmers in the developing countries should also receive income support for restricting tobacco production on the same lines as the de-coupled income support given to the farmers in the US right from 1980's and which became a part of Common Agricultural Policy (CAP) adopted also by the European Union in 1995.

Sometimes the tobacco traders may also be interested in reducing tobacco cultivation for avoiding price declines as a result of expansion in tobacco output. Such short-term effects of high prices due to supply restrictions on tobacco may have to be tolerated as a transitional phenomenon. To counter such moves by the traders the government may levy heavy taxes on tobacco products, the incidence of which should fall on both the traders and purchasers. The governmental initiative in respect of agricultural diversification should obviously have a comprehensive and long term perspective of controlling the tobacco epidemic.

## IX. LESSONS FROM EXPERIENCES OF SELECTED COUNTRIES :

In some of the major tobacco producing countries tobacco is considered a major source of revenue for the government. It is also a major source of export earnings. For example, **Zimbabwe** exports 99 percent of its tobacco produce. Hence, it is a major source of export earnings, more important than even gold. 24 percent of Zimbabwe's total export earnings were from tobacco while from gold only 13 percent of export

[6] *World Bank (1999)* 'Curbing the Epidemic : Governments and the economics of tobacco control'. ***Development in Practice series.*** *Washington. D. C. The World Bank*

earnings were realized. In such a situation any attempt at diversification of agriculture away from tobacco would be a very difficult decision. The margins from tobacco cultivation in Zimbabwe were significantly larger than from other crops[7]. This is revealed from table below. (16-B) In this background of significant export demand and high monetary margins it may be difficult to persuade farmers to diversify from tobacco. It was also estimated that the price elasticity of demand for cigarettes in Zimbabwe is significantly high, implying that if the price of cigarettes is raised the demand for them would significantly decline.

Thus, **it is more the export channel for tobacco export rather than the domestic demand, which seems to sustain tobacco cultivation in Zimbabwe.** It may be recalled from the statistical exercise reported earlier that the elasticity of production and area w.r.t export price, was fairly high in the case of Zimbabwe. In such a case, agricultural diversification away from tobacco has not found much favour though some attempts were made in this direction.

**Table 20**
**Zimbabwe's principal agricultural exports, 1990-96**
**(US$ million, current prices)**

| | Tobacco | Cotton | Sugar | Coffee |
|---|---|---|---|---|
| 1990 | 406 | 82 | 19 | 31 |
| 1991 | 313 | 43 | 21 | 16 |
| 1992 | 406 | 25 | 0 | 11 |
| 1993 | 351 | 23 | 0.2 | 5 |
| 1994 | 433 | 60 | 90 | 13 |
| 1995 | 481 | 46 | 63 | 24 |
| 1996 | 697 | 80 | 96 | 2 |

**Table 21**
**Gross Margins for tobacco and selected crops (Z$ per hectare)**

| Crop | Gross income | Variable cost | Gross Margin |
|---|---|---|---|
| Flue-cured tobacco | 25740 | 8431 | 17309 |
| Coffee | 10716 | 8023 | 2689 |
| Wheat | 2857 | 1769 | 1088 |
| Cotton | 2498 | 1702 | 795 |
| Groundnuts | 3190 | 2516 | 674 |
| Maize | 1500 | 1196 | 304 |
| Soya beans | 1344 | 1051 | 293 |

*Source : Agricultural Marketing Authority (1986)*

In the case of Zimbabwe the conventional crops, the cotton, sugar, coffee do not seem to be viable substitutes for tobacco. Studies have shown that **the potential substitute for tobacco may be seen in horticultural crops, fruits, vegetables and cut flowers.** The country has varied climatic conditions and different types of horticultural crops may be tried in different climatic conditions of the country. The studies also show that poor financial conditions of the farmers may not permit them to incur heavy capital

[7] Mara Maravanyica, Tobacco Production and the Search for Alternatives in Zimbabwe, *The Economics of Tobacco Control* Eraj Abedian et al (Ed.) Applied Fiscal Research, University of Cape Town, 1998, pp270-281.

costs involved in shifting from tobacco to horticultural crops : for, preserving the horticultural products which are likely to be more perishable than tobacco leaves, transportation of the horticultural products to the export points etc. would involve huge expenditures, which the poor farmers cannot afford. In fact, very high margins involved in some of the horticultural crops (Rose blooms) as compared to tobacco might help persuading farmers to diversify. A comparative picture of gains from tobacco and from rose blooms is presented below:

**Table -22**
**Cash flow projections for rose blooms (Z$/ha)**

| Crop | Gross income | Variable costs | Gross margin |
|---|---|---|---|
| Flue - cured tobacco | 25740 | 8431 | 17309 |
| Rose blooms | 919170 | 162163 | 757007 |

*Source : Standard Chartered Bank (1991)*

However, care also needs to be taken to maintain the price of these products at acceptable levels when many farmers come forward to diversity from tobacco. World demand for horticultural products is expected to increase. In this background, ***if adequate price support is ensured, adequate transportation facilities are provided, adequate assistance is given to meet the new capital costs for preservation of the horticultural products and suitable steps are taken for suggesting the export outlets to the farmers, then Zimbabwe farmers may be persuaded to diversify from tobacco in a phased manner.*** Possibly, the starting of processing plants for the horticultural products may also be one of the visible incentives that may be provided for inducing diversification. The role of the government and of the international community may be very crucial in this regard. We also emphasize ***a phased programme of shifting extended over a period of say 5 to 10 years for moving to horticultural crops in Zimbabwe.*** This is necessary to safeguard the economic conditions of the Zimbabwe tobacco farmers.

**India is another country, which gets large amounts of tax revenue and export earnings from tobacco.** There are as many as 8 varieties of tobacco which are grown in different parts of the country. Central excise revenue from tobacco increased from Rs.7160 million to Rs.55400 million during a period of 1980-1998, though the share of tobacco in total excise revenue has declined from 11 percent to 9.6 percent. In real terms, it should be noted, the central excise revenue from tobacco would not show the same amount of increase. ***Tobacco is considered in India as a commodity of national importance.*** That is why, according to the Indian Constitution, tobacco is one of the 3 products (sugar and textiles, being the other two) which have been declared as the commodities on which the Government of India can levy an excise duty in lieu of sales taxation levied by the state governments in the Indian federal setup. Export of tobacco has also been showing a continuously increasing trend over the years. Un-manufactured tobacco exports increased from Rs.1240 million to Rs.9100 million during 1980 to 1998. Only Rs.160 million worth of manufactured tobacco-products were exported in 1980 whereas in 1998 Rs.1470 million worth of manufactured tobacco products were exported. In this sense, it would be a difficult decision for any government to consider seriously in the short run, any recommendation for agricultural diversification away from tobacco. In

the long run, however, the revenue advantages of shifting from tobacco would be, as stated earlier, surely significantly large.

It is also a difficult decision for the farmers to diversify because they do not have adequate guidance about the alternatives to tobacco as revealed from our field study. In fact, tobacco, which was introduced by Columbus into India some more than 400 years ago, was not a very successful crop in the northern part of India. Only in western and southern part of the country tobacco cultivation seems to have picked up after a lot of trial and error. The soil and climatic conditions of the region where tobacco is currently successfully grown seem to be particularly suited to tobacco cultivation. As stated earlier, from our micro level action research study, it has been noticed that farmers are particularly not very enthusiastic to grow tobacco and they are keen to take to alternative cultivation or alternative economic activities to tobacco cultivation if proper facilities are provided. Most important of these facilities, according to the farmers, is provision of adequate irrigation facilities which would have facilitated trying out alternative crops, particularly high paying commercial crops like sugarcane. Tobacco farmers are under the stranglehold of tobacco traders who give loan to the farmers for continuing tobacco cultivation. So far as Karnataka, a state in southern India, is concerned, the middlemen are from other states, which have least stake in maintaining the financial conditions of the farmers of the state. Hence, the decisions for growing tobacco are taken by these middlemen. Therefore, the farmers are helpless in taking any independent decision for diversification of agriculture away from tobacco. In the case of bidi tobacco the government has not introduced the system of regulated markets so that adequate support price is given to the farmers. In this background, the farmers feel frustrated when the price dictated by the middlemen is not an adequate incentive for continuing with tobacco cultivation if the decision making was left to them. In such a situation, carefully worked out programme of educating the farmers and the government, highlighting the negative effects of tobacco farming, is necessary inducing agricultural diversification.

The action research project undertaken by CMDR provided a challenging opportunity to understand the crucial factors facilitating the diversification of agriculture away from bidi tobacco. This study has been undertaken in one of the tobacco producing districts of Karnataka. The study tried to identify the crucial agriculture related determinants of tobacco cultivation, based upon the understanding of which, an action programme was designed after nearly thirty meetings with the farmers. These meetings facilitated interaction of tobacco farmers with innovative farmers of other crops, bankers and insurance companies. It was noticed that the majority of the farmers of the project region were interested in diversifying. A focus group of 100 farmers was identified by way of an example of shifting. After interactions with the innovative farmers of other crops, officials of financial institutions and crop insurance companies, the farmers themselves expressed a desire to shift from tobacco to, say, soybean, if irrigation facility is not available, or to sugarcane if irrigation facilities are provided, and to dairy farming if adequate financial support is given for the purchase of milch animals and transportation facilities etc. The project provided quality soybean seeds to about 60 farmers who expressed a desire to sow soybean in place of tobacco in parts of their tobacco area. The project also facilitated credit facilities from the lead banks of the region for purchase of quality milch animals to more than 30 tobacco farmers with a commitment that the project will assume the partial repayment of the loan for one year. The project has planned to monitor the result of this scheme over a longer period. The project has deliberately suggested to the farmers that they should diversify part by part in a phased manner and not undertake 100 percent diversification at one stretch. This seems to have aroused confidence in the farmers about **'their'** decision to diversify. In order to raise the level of awareness amongst tobacco growing families about the necessity to diversify agriculture away from tobacco in their own interest and in the interest of the nation the project instituted prizes in the schools for better performing children of tobacco-shifting-farmer-parents. The farmers seem to be responding enthusiastically to these various schemes for facilitating shifting. The fact that many farmers are interested in availing of the bank loan for milch animals, taking to soybean cultivation, and also the fact that in the village meets organized by the project the farmers assembled in large numbers etc. is an encouraging sign for agricultural diversification away from tobacco in the region. The project has also plans of trying out such a model of agricultural diversification in other tobacco growing regions of the country also.

A programme of educating the government officials should consist of highlighting the direct and indirect resource costs of tobacco related diseases, the cost of treatment of which significantly out weigh the excise revenue and export earnings from tobaccco[7].

**Vietnam** is an unique country where production, distribution and marketing of cigarettes is a state managed enterprise though tobacco cultivation is left to the farmers. Output growth of tobacco in Vietnam has been increasing at the rate varying between 67.5 percent to 112 percent in different years during 1980's and early 90's. Area under tobacco has declined during 1980 to 1993. Thereafter it is showing the sign of increase once again. A study of economics of tobacco and other crops in Vietnam shows that golden tobacco and brown tobacco have the net profit per hectare, nearly 5 times the profit per hectare as compared to corn, more than 8 times the net profit as compared to

[7] In an earlier IDRC sponsored study, CMDR estimated such costs. P.R.Panchamukhi et. Al ***: Resource Costs of Morbidity and Under nutrition***, Centre for Multi-disciplinary Development Research, Dharwad, Karnataka India, 1997

rice, more than 3 times the net profit in the case of cassava and twice the net profit of peanuts. In this background, the **government itself has been taking the initiative to encourage cultivation of tobacco.** The Southern Tobacco Supply Company, a subsidiary of Vietnam Tobacco Corporation has a commitment of purchasing 16000 tones of tobacco every year directly from farmers for both export and domestic cigarette production. In this background the question of tobacco control in Vietnam has been of the lowest priority. Since significant quantum of tobacco leaves are used for domestic cigarette production the control of tobacco supply is considered to be dependent mainly on the control of the demand for cigarettes. Since the raising of the cigarette prices may act as a double edged weapon for promoting smuggling of cigarettes and also reducing the tax receipts for Vietnam government, this does not find a favour from the officials. **Health education campaigns are recommended as a more dependable method of controlling tobacco supply,[8] though this method is likely to take longer period.** The efforts at diversification have received a lukewarm response in Vietnam particularly because of apparently pro tobacco stance taken even by the government of the country.

## X. ANY LESSONS FROM DIVERSIFICATION IN OTHER COUNTRIES ENGAGED IN CULTIVATION OF MERIT BADS LIKE COCA AND POPPIES ?

In Thailand poppy cultivation was and is very popular amongst the farmers of some regions. The Thai government was interested in eliminating poppy cultivation. However, for several reasons this has not been possible. The United Nations Programme for Drug Abuse Control (UNPDAC) was initiated from September 1972. The experiment has been going on since that time and this programme has been extended from time to time since then[9].

The programme has **suggested coffee, onion, garlic, etc., as the major crops alternative to opium growing.** A survey of the selected households in the project complex has shown that farmers are producing opium mainly for the purpose of exchanging it for their food requirements throughout the year. Poppy cultivation has been considered as a practical way of surviving for Thailand's farmers, despite their explicit aversion to it. Farmers were found to be interested in owning rice fields and to permanently settle down in one place rather than being forced to follow their present system of shifting agriculture. If suitable advice and assistance for growing alternative cash crops are available then diversification of agriculture away from poppies is likely to be feasible.

In order to strengthen collective action against sources of supplies of poppies aerial vigilance and destruction of poppy fields has also been tried. Though the success rate is not high, the efforts have shown that **multi pronged approach is needed for agricultural diversification away from poppies.**

[8] Hoang Van Kinh et.al : 'The Economics of Tobacco Control in Vietnam' paper presented in an IDRC sponsored Tobacco Control Meet in Bangkok.
[9] Gary Yia Lee: 'Tribal Socio-Economic Change : Dream and Reality'. Abbotsburg, NSW. Australia 2176.

This experience of diversification away from poppies as documented for Thailand is quite helpful in the case of the initiative for agricultural diversification away from tobacco. The tobacco cultivation is also an involuntary decision as in the case of poppy cultivation. A positive initiative seems to be necessary to give technical advice to the farmers for the alternative crops and alternative economic activities. This technical advice also needs to be followed up by adequate financial support and suitable assistance in terms of quality seeds of alternative crops. Until the alternative cropping pattern gets firmly settled, a well designed crop insurance covering both crop failures due to uncertain rains and volatile price fluctuations, is most important. Any change to be successful has to be endogenously evolved rather than be exogenously imposed on the farmers. The farmers may be facilitated to form their own associations or cooperatives (say, **Tobacco Shifters Cooperatives, Milk Cooperatives of Tobacco Shifters etc)** through which the decisions to shift from tobacco, decisions to devote part of the land for other crops, etc. decisions to adopt mixed cropping pattern, to use fertilizers and pesticides for alternative crops etc. may be taken. It is also necessary to ensure adequate price support to the products of the alternative crops. It is only with such multi-prolonged initiatives that diversification may be facilitated.

**XI. CONCLUDING OBSERVATIONS**

High labour intensive nature of tobacco cultivation has been put forth occasionally as an argument in support of tobacco cultivation rather than diversification. This argument is quite appealing in high population and labour surplus developing economies where employment opportunities otherwise are not easily available. The labour intensive nature of cultivation of tobacco, large number of workers involved in distribution and vending of tobacco products etc. has to be considered as a noteworthy point. To this one must also add the number of medical and para-medical personnel required for treating tobacco linked diseases ! What is really important is not simply comparison of the labour intensity of entire activity alone but labour intensity of the 'desirable' economic activities. **Employment opportunities of a merit bad cannot make it into a merit good.**

If tobacco needs to be cultivated in view of the environmental and soil conditions of the region then, **alternative uses of tobacco need to be focused upon**. As early as in 1981, WHO Farm Bureau declared that future tobacco should be looked upon as one the world's principal sources of protein for human consumption and livestock feed, for, before it matures tobacco plant contains the most **superior protein**. According to Prof.Ginzel the functional characteristics of tobacco as protein surpass those of even animal proteins like egg and milk and it possesses optimal amino acid composition which lowers cholesterol. In this background a protein extracting-plant was initiated way back in 1979 in the US. However, the pilot project could not make any major headway because of the subtle but powerful opposition from smoking, chewing, snuffing tobacco lobby. One has to examine the possibility of international assistance for tobacco protein extraction initiative to the developing countries, heavily dependent upon tobacco for revenue and export earnings.

Thus, the tobacco free initiative should focus on a multi-pronged strategy of agricultural diversification in a phased manner away from tobacco, use of tobacco for alternative purposes and shifting away from tobacco to other economic activities. Such a multi-faceted approach is likely to be more effective than legislation to control tobacco. In order that such a strategy evolves out of farmers' own initiative, an intensive awareness programme about damages from consumption of tobacco and advantages from the protein content of full grown tobacco plants etc. needs to be initiated on a massive scale in such countries. The system of quota restrictions imposed on the cultivation and trade of other commodities should be made applicable to tobacco as well as part of GATT Agreements. This policy needs to be implemented in a phased manner in order to safeguard the interest of economies of the major tobacco dependent countries. It may be in the interest of tobacco control to treat tobacco control programme independently of programmes of controls of other merit bads. Drugs, drinks, tobacco and other addictive substances should not form a strong united front to counter any of the national and international control initiatives. It is in this background that the international tobacco control initiative should receive an independent focus. The involvement of the micro level anti tobacco initiatives, NGO's, religious leaders, opinion makers of the society etc. is necessary in order to make the tobacco control initiative an enterprise of at least moderate success during the next decade.

## XII. ELEMENTS FOR CONSIDERATION OF FRAMEWORK CONVENTION FOR TOBACCO CONTROL(FCTC)*

From a detailed study of agricultural diversification for tobacco control in different countries, the following elements of concrete policy action can be considered for inclusion in the ***Framework Convention for Tobacco Control***. Since tobacco is a global epidemic, a global perspective would be necessary for its control. Since for agricultural diversification for tobacco control national initiatives and international initiatives are required, the elements for ***Framework Convention*** are outlined below under three categories namely (a) National Initiatives (b) Initiatives from developed countries and (c) Initiatives from tobacco dependent developing countries, taken together.

### (a) National Initiatives:

i. Policy towards agricultural diversification for tobacco control, should be based upon a thorough study of the determinants of tobacco cultivation in the country. Ad-hoc field investigations have to be conducted for collecting the necessary data in this connection. Since the determinants of tobacco cultivation are likely to be region specific and also specific to the variety of tobacco (Flue-Cured Virginia (FCV) or bidi tobacco or hukka tobacco etc.,), separate field investigations have to be conducted for developing ***the micro level information bank.***

ii. In order to control tobacco production and in order to put a brake on diversion of land from other crops to tobacco, suitable initiatives have to be taken ***to educate the farmers about the ill effects of tobacco cultivation***. The adverse effects on health of women and children in particular, due to frequent spray of fertilizers and

pesticides for tobacco, aroma of tobacco, skin irritation due to frequent touch of the tobacco leaves, effects on children in the form of sacrificing schooling in favour of tobacco – related jobs etc., need to be highlighted in this process of educating farmers. In addition, the health hazards from tobacco consumption, for which tobacco farmers are indirectly responsible, should also be highlighted in the sensitization programme. Street plays, video shows extension lectures by medical experts, anti-tobacco ***preaching by religious heads***, village elders etc., may be the *modus operandi* of sensitization of the farmers in this connection. Services of NGOs and grass-root level voluntary organizations may be taken for the purpose.

Since, favourable gender ratio is found to be associated with reduction in area under tobacco cultivation and also tobacco production ***women motivators may be inducted for sensitizing the farmers for the purpose of shifting.***

iii. ***The most important point for ensuring agricultural diversification away from tobacco is the involvement of the tobacco farmers themselves at different stages of implementation of agricultural diversification.*** The tobacco farmers should feel the sense of participation in this social cause. Studies have shown that endogenously evolved reforms are likely to be more effective than exogenously imposed reforms.

iv. Wherever diversification of agriculture is considered effective in diverting farmers from tobacco cultivation the governments of the nations may have to initiate ***appropriate policies for guiding the farmers about the alternative crops in place of tobacco and /or mixed cropping systems along with tobacco as an initial strategy of permanently shifting away from tobacco in the long run.*** The government, NGOs or grass-root level voluntary organizations have to act as facilitators between the currently tobacco farmers (potential shifters) and agricultural scientists, innovative farmers of alternative crops, officials from banking institutions having schemes of assisting farmers with respect to the alternative crops, representatives from insurance companies to provide insurance for alternative crops, etc. Even when the farmers are willing and keen to diversify agriculture and thereby control tobacco cultivation, they are not doing so primarily because they do not have adequate information about the alternative agricultural opportunities. Similarly, if farmers are keen to undertake ***alternative economic activities in place of tobacco cultivation***, then similar initiatives have to be taken to ***enlighten them about such alternative activities*** ( such as dairy farming , sericulture, horticulture etc.). The scientific advice for the farmers may consist of information about the quality of soil, suitable crops for that soil, the fertilizer, insecticides and pesticides required by the alternative crops, required irrigation, net returns from tobacco and the alternatives, marketing opportunities within the country and prospects for export etc. Most often the farmers are ignorant about such scientific information and information about the official procedures.

***v.*** Wherever for alternative crops irrigation facilities are required (such as paddy, sugarcane etc.,) the ***government may have to take initiatives to provide lift irrigation facilities with suitable financial assistance to the shifters from tobacco. The government also has to ensure that irrigation facilities are not used for tobacco cultivation itself. Since, excessive use of irrigation facilities adversely affects the quality of soil the farmers need to be educated about such adverse effects.***

vi. Farmers in developing countries generally do not maintain the accounts of their farming operations. Hence, they are ***likely to be carried away by the gross returns from cultivation rather than the net returns***. Since the net returns in the case of tobacco are likely to be less than the net returns in the case of other crops the ***farmers need to be educated about the true economics of tobacco cultivation***. The reasons for not growing tobacco in the tobacco region, need to be probed further and they should be highlighted.

vii. Since tobacco supply is highly elastic with respect to the price in the domestic market and also the export price, the ***government may have to regulate this price*** in order to ensure shifting of farmers away from tobacco. The price of tobacco should not be allowed to be raised beyond a particular threshold level. In order to protect the tobacco farmers from the adverse effects on their economic conditions due to the restrictions on the tobacco price ***suitable income support programme for the tobacco farmers may have to be initiated by the governments of the respective countries***. The details of such income support programmes have to be worked out keeping in mind the local circumstances of the tobacco producing countries.

viii. Governments should levy ***deterrant indirect taxes on tobacco leaves and on tobacco products, the proceeds of which should be earmarked for compensating farmers*** who are diversifying, for the income loss. Price effects of such taxes may have deterrant effects on consumers of tobacco products, depending upon price elasticity of demand.

ix. Since tobacco supply is responsive to the area under tobacco cultivation, the governments of the tobacco producing countries may have ***to take measures to restrict the tobacco area in a phased manner***. Once again, the likely adverse effects of such measures on the economic conditions of the tobacco cultivating families have to be counter balanced by suitable income support programmes for the tobacco shifting farmers (on the same lines as the ***de-coupled income support*** given to the farmers in the US) , and considered permissible under the structural adjustment programme treaties. Initiatives may be taken ***to form tobacco shifters' cooperatives / associations*** in order to give a sense of working for a common social cause and also a sense of self assurance under any eventuality. The policy makers, the voluntary organizations dealing with agriculture etc., have to be suitably guided to take a sympathetic view of the demands of such tobacco shifters' cooperatives. ( say, in the case of fertilizers for the alternative crops,

irrigation facilities, concessional supply of power etc.) In order to wean away women of tobacco farming households, who are mostly engaged in tobacco related activities from such activities the NGOs and the governments should ***provide incentives to women for socially useful and reasonably remunerative alternative activities*** (such as forming women's social associations, promoting through such associations self employment activities like tailoring, knitting, food processing and related activities).

***x.*** If the farmers consider other activities, other than agriculture as alternative to tobacco cultivation then similar support measures would be necessary in order to maintain the economic conditions of the farmers. ***In the case of dairy as an alternative, for example, the support services of veterinary experts, financial support for purchasing milch animals, animal feed, equipment for preservation of milk and milk products, marketing arrangements etc., should be part of the package of measures.***

***xi.*** Governments of tobacco producing countries seem to be following an inconsistent policy of promoting tobacco cultivation, for, huge grants are made for tobacco research activities in these countries. Also, tobacco cultivation is highly subsidized, enjoying fertilizer subsidies, irrigation, subsidies, electricity rate subsidies, etc. As against this the governments also advertise the ill effects of cigarette smoking (and not tobacco consumption !) . ***The governments have, therefore, to stop such assistance in the interest of shifting from tobacco.*** Such a policy has to be initiated in a phased manner. It should be supplemented by suitable ***measures to protect the farmers from the likely economic losses*** from such a policy.

**(b) Initiatives from the developed countries helpful for agricultural diversification away from tobacco.**

i. Since in the developed countries the tobacco yield is found to be fairly high as compared to that in developing countries the former have a special responsibility towards controlling the tobacco epidemic. ***The funds spent on tobacco research in the developed countries should be diverted to assist the tobacco dependent developing countries towards financing alternative activities to tobacco farming and also for the payment of de-coupled income support for the tobacco farmers*** for shifting away from tobacco.

***ii.*** While the demand for tobacco in developed countries is declining, the same in developing countries of Asia and Africa is found to be increasing. In fact, the focus of the tobacco multi-nationals on Asia and Africa needs to be considered with a high degree of seriousness. In this background, and in the background of high yield of tobacco leaves in the developed countries, if the developed countries continue to promote export of tobacco to the developing countries, then the developing countries would be doubly hit, for, the farmers in developing countries

would have lost their income earning opportunities in tobacco cultivation ( after shifting) and the incidence of tobacco epidemic falls heavily on the people of the developing countries. ***It is therefore, necessary for the tobacco producing developed countries to restrict tobacco exports to all the other countries in general and developing countries of Asia and Africa, in particular.***

***iii.*** The developed countries have to take the initiative for effectively countering the global pro-tobacco advertisement campaign of the tobacco multi-nationals. It appears that in a clandestine fashion the tobacco multi-nationals receive implicit support from the developed countries. ***In view of the better economic power the developed countries have to take upon themselves the major responsibility of not only not supporting implicitly, the tobacco multi-nationals but also initiate counter advertisement campaign to eradicate the tobacco menace in all the countries.*** One of the major initiatives in this connection would be to alienate tobacco farmers from tobacco traders and multinationals.

**(c) Initiatives to be taken by the tobacco dependent developing countries.**

i. Tobacco dependent developing countries should form ***regional associations*** in order to restrict the tobacco menace in their respective regions. One of the important mandates of such associations should be ***to encourage agricultural diversification*** away from tobacco and protect the interests of farmers after diversification.

***ii.*** The tobacco dependent developing countries should present a ***common front before other tobacco producing developed countries in order to ensure agricultural diversification and tobacco control in the developed countries as well.*** Coupled with this the ***developed countries should be motivated to restrict their tobacco exports to the other countries.***

iii. An agreement should be reached in the regional associations of tobacco dependent developing countries to ***levy a deterrent tax on tobacco products falling on dealers***. This is likely to achieve two purposes viz., to motivate tobacco cultivator to shift away from tobacco cultivation and to deter tobacco commission agents and tobacco traders from exploiting the tobacco cultivators.

iv. The governments of tobacco dependent developing countries should ***introduce special measures for saving the tobacco cultivators from the debt trap of tobacco dealers.*** If need be, such ***debts may be written off*** which may act as an incentive for the farmers to shift away from tobacco.

v. The governments in the tobacco dependent developing countries should not consider tobacco as a source of indirect tax revenue since the health and medi-care expenditures to be incurred by the government to tackle the tobacco epidemic are found to be several times larger than the revenue gains from tobacco taxation. ***Suitable amendments to the national constitutions may be initiated in order to***

***enable all the governments in a federal set up to levy a prohibitive tax on the merit-bad of tobacco leaves.*** In India, for example, the governments may be authorized at the state and national levels to levy heavy indirect taxes on tobacco leaves and tobacco products, the proceeds of which may be earmarked for countering tobacco menace.

On the whole, an integrated approach of tobacco control, incorporating region specific elements seems to have a bigger mileage in achieving the objective of controlling the tobacco epidemic. The supply side measures focusing on agricultural diversification may be considered as long term measures to supplement the demand side measures. It should also be emphasized that only the demand side measures within a country without global control of supply side, may not achieve the goal of tobacco control within a reasonable period of time.

***Acknowledgements***

*My grateful thanks are due to Dr.Rohinton Medhora,Senior Specialist-Economics,IDRC,Canada,.and to Dr.Sharad Vaidya, National Chairman, NOTE, Goa,India for their valuable comments and suggestions while writing this paper. I have had discussions with Dr.S.B.Debi, Ms.N.S.Nayak, Dr.G.Kadekodi, Dr.V.R.Panchamukhi, and others regarding different aspects of this paper. My thanks are due to all of them. Research and Statistical Assistance was provided by Mr.V.B.Annigeri and Mr.A.R.Kulkarni. Secretarial Assistance was provided by Mr.B.P.Bagalkot. Mr. Gururaj V. H. Mr. Kushal Ms. S. T. Kulkarni* My thanks are due to them

*An earlier version of this paper was presented in an international meeting organized by WHO in Delhi in October 1999. I express my thanks to all the participants in this meeting who made useful comments and suggestions.*

*I express my thanks to WHO for asking me to write this paper.*

*Note : A number of statistical tables appended to an earlier version of the paper are not enclosed here. They are available on request.*