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# ANNOTATED BIBLIOGRAPHY OF ECONOMIC ANALYSIS OF AGROFORESTRY SYSTEMS/TECHNOLOGIES

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## 1. Introduction

Economic analysis of agroforestry (AF) systems/technologies is necessary for one to be able to pass a balanced judgement on the different approaches to land use which are described as agroforestry. Recently, ICRAF has undertaken a number of activities in an attempt to make such an analysis possible. A working paper was produced on the use of economics in agroforestry, followed by a working paper analysing a candidate AF technology. Furthermore, tools and methods for the economic analysis of AF systems/technologies were developed with the help of consultants resulting in a micro computer programme, MULBUD (acronym for multiple crops, multi-period budgeting). A methodology paper on the stepwise use of linear programming to model multi-period silvi-pastoral systems is under preparation.

The following annotated bibliography is meant to provide background information for economic analysis of AF systems/technologies, i.e. methodological aspects as well as cost/benefit data. However, care should be taken with the interpretation of the information, not only because local conditions may vary considerably from the ones obtaining on sites in the reference material, but also because a lot of data in the references are projections rather than actual.

## 2. Contents and sources

In putting this bibliography together, only those references dealing with economics and agroforestry simultaneously were considered. This eliminated references which, for example, only dealt with bio-physical aspects of AF systems/technologies as well as those references only dealing with the economics of components of possible AF systems/technologies.

The resulting number of references is rather small, also because the search was based mainly on documents found in ICRAF's own library. Readers of this bibliography are therefore invited to provide additional references for inclusion in future issues.

## 3. Arrangement of bibliography

To facilitate selective retrieval of information, all references in this bibliography have been entered on a micro computer using a commercially available data base management package (DBASE). Each reference (record) contains the following fields.

### 3.1 Data fields per record

The first field is called *author and title* and it contains the following information on the reference, i.e. author's name(s), year of publication, title of publication and source.

The second field is called *AF System*. Since this field is recommended for selective retrieval, each system has been entered under any of the following main systems.

| | |
|---|---|
| *Silvicultural system* (SILVI) | : Woodlots, private or communal, except tree protein banks. |
| *Agri-silvicultural system* (AGRI-SILVI) | : Mixture of trees and crops either in space or in time. Most well-known are alley cropping, taungya, shifting cultivation. |
| *Silvi-pastoral system* (SILVI-PAST) | : Mixture of trees and livestock either in space or in time, including protein banks. |

| | | |
|---|---|---|
| *Agri-silvi-pastoral system* (AGRI-SILVI-PAST) | : | Mixture of trees, crops and livestock in time or in space. |

It may be argued that silvicultural systems, by definition, are not agroforestry systems. This is probably true; however, it was felt that those silvicultural systems which either use "non-forestry" species and/or are not managed by the Forestry Department can provide useful data for the analysis of agroforestry systems.

The word *silvi* should be interpreted in the widest possible sense in that it also includes fruit trees and plantation crops.

Some commonly known alternative names of AF systems are entered in the same field, always after the system's main classification. Examples are: taungya, woodlot, protein bank, alley cropping, shifting cultivation. Taungya systems were further subdivided on the basis of whether they were governmental (GO) or private (PR), while woodlots were subdivided into communal (CW) and farm (PR) woodlots.

The third field is *location*, which, because it is not recommended as a search field, contains unstandarised descriptive information, such as country, region or other location description.

The fourth field, i.e. *tree species*, contains the botanical name of the species whenever possible.

The fifth field is dedicated to *tree products* which are defined as all output harvested or collected irrespective of whether it is an end or intermediate product or whether it is sold or consumed. The following key words may be used for selective retrieval: fodder, woodfuel (charcoal and/or fuelwood), fruits, mulch, poles, construction wood, pulp.

The sixth field is called *tree services* and contains all immaterial output which is obtained from individual trees and/or from the

spatial arrangements of the trees within a system.

The following key words may be used for selective retrieval: micro climatic (shade, shelter against wind, reduced evapo-transportation), soil improvement (nitrogen fixing, soil structure, soil o.m.), erosion control (contour planting).

The seventh field is called *crops* and gives the common names of the non-tree crops which are part of the AF systems. This may include planted grasses in silvi-pastoral systems.

The eigth field is called *animals* and gives the common names of the animals which are part of the AF systems.

The ninth, tenth, eleventh, twelfth and thirteenth fields each contain a yes or no statement to the questions, does the reference contain: *methodological* aspects ? *yield* data ? *cost* data ? *benefit* data ?

The fourteenth field contains the *reference number* which may be used to request more information on a particular reference.

3.2. Abstract

A brief abstract was prepared of each reference focusing on the economic content of the document rather than the general content.

Acknowledgement

The authors wish to acknowledge Mr. Patrick Robinson's (C.F.I) contribution in providing them with the results of a systematic search of existing ICRAF library holdings as well as Mr.Bram Filius' (University of Wageningen) contribution of some references. Mrs. Lubaina Fidaali's (ICRAF) input in programming is also gratefully acknowledged.

AUTHOR,TITLE : A.I.D.(1980). The socio-economic context of fuelwo use in small rural communities. A.I.D. evaluation pecial study no 1.Washington.

AF SYSTEM : Silvi,woodlot(cm)
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0043

An extensive review of fuelwood issues is presented including supply ources, consumption, methods and time of collection. It concentrates n community fuelwood programs including cost and benefit issues and di tribution of products to different groups in society. A bibliography n this subject is included as an appendix.

AUTHOR,TITLE : Alferzez,A.(1981). Utilization of leucaena (IPIL-IP L) as organic fertilizer to food crops. Animal Husba ndry & Agricultural Journal. 4pp

AF SYSTEM : Agri-silvi, alley-crop
LOCATION : Philippines
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Fodder, mulch
TREE SERVICE : Soil improvement
CROPS : Maize
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : no
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0066

Corn plants fertilized with herbage from intercropped leucaena produce d as much grains (3,0 tons/ha) as a pure stand of corn (without leucaen a intercrop) benefiting from artificial fertilizer(N.P.K.=60.30.30.kg/h a). A higher herbage yield was obtained in plots where leucaena was int ercropped in single hedgerows spaced 2 meters apart as compared to plot s with triple hedgerows spaced 5 meters apart.

AUTHOR,TITLE : Arnold,J.E.M.(1982). Economic constraints and incentives in agroforestry. In "Proceedings United Nations University Workshop on Agroforestry",Freiburg, West Germany. (Not yet published).

AF SYSTEM : Agri-silvi,shift-cult,taungya
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0038

Benefits or incentives to tree production are a better use of land and labour resources, spreading of risk, increased revenues, reduction in costs, creation of savings. Costs and constraints are, competition for scarce resources, especially when there is an increasing demand for the same resources, longer production periods, increased risk if there is insecurity of tenure, protective measures for trees against damage by livestock or termites, traditional practices, etc. A proper analysis of the system's functioning is required before defining appropriate agroforestry systems.

AUTHOR,TITLE : Balasuoramanian,V.(1983). Alley cropping: Can it be an alternative to chemical fertilizers in Ghana.? Paper Third National Maize Workshop at Kwadeso Agricultural College, Kumasi, Ghana.

AF SYSTEM : Agri-silvi,alley-crop
LOCATION : Ghana
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Mulch
TREE SERVICE : Soil improvement
CROPS : Maize,yam,cowpea
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0021

The economics of a leucaena alley cropping systems with yams, maize and cowpeas are described. First year data indicate that labour requirements increase as compared to sole cropping. The study gives detailed labour data as well as yield data.

AUTHOR,TITLE : Ball,J.(1977).Taungya in Southern Nigeria.F.A.O.

AF SYSTEM : Agri-silvi,taungya(go)
LOCATION : Nigeria,Southern
TREE SPECIES : Tectona grandis,Gmelina arborea
TREE PRODUCTS : Construction wood
TREE SERVICE :
CROPS : Maize,yams,cassava,vegetables
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0014

The taungya systems as practised in the forest reserves in Southern Ni eria are discussed. Three systems are compared with each other,i.e. de artmental taungya ( foodcrop grown by forest department), traditiona taungya ( foodcrop grown by farmers) and direct planting (no foodcrop rown). Intercropping of annuals takes place for 2 years (maize,cassava yams, vegetables) while teak is grown on a 60-year rotation and gueli a over two 15-year rotations. Disadvantage of traditional taungya is p or stocking of trees due to poor discipline amongst farmers, while dis dvantage of departmental taungya is low agricultural yields and high s pervisory costs.A cost/benefit analysis of each system is conducted fr m the forest department point of view only.

AUTHOR,TITLE : Beale,C.I.A. (1980).Economic aspects of developing eucaena as cash crop: A review of pre-investment s dies in Malawi,1974-79.In "Browse in Africa",ed H.N le Houerou, ILCA,Addis Ababa

AF SYSTEM : Silvi-past,protein bank
LOCATION : Malawi, lower Shire valley
TREE SPECIES : Leucaena Leucocephala
TREE PRODUCTS : Fodder
TREE SERVICE :
CROPS :
ANIMALS : Cattle,chickens
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0001

Leucaena leucocephala grown as a commercial fodder crop in woodlots on small holdings is examined. This study is conducted on the basis of a tual observations in an F.A.O/U.N.D.P. Project in Malawi over the peri d 74-77. Cost of fencing individual plots on small farms proved to be prohibitive and the project therefore tried woodlot planting (up to 14 hectares). The study contains yield and labour data. Study concludes that leucaena may be grown commercially, but market for leucaena leaf eal needs to be better developed.

AUTHOR,TITLE : Bishop.J.P.(1979).Cattle-forest production in the h spanic American humid tropics.INIAP, Equador.

AF SYSTEM : Silvi-past
LOCATION : Hispanic American humid tropics(Latin America)
TREE SPECIES : Cordia alliodora
TREE PRODUCTS : Construction wood
TREE SERVICE :
CROPS : Velver bean,kikuyu grass
ANIMALS : Cattle
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : no
BENEFIT DATA : yes
REFERENCE NUMBER : 0047

The yields and benefits over a period of 20 years of a theoretical silv i-pastoral system of cattle fodder and timber production are presented.

AUTHOR,TITLE : Brewbaker,J.L(1980).Giant leucaena energy tree for An economic feasibility analysis for the Island o Molokai, Hawaii.Hawaii Natural Energy Institute.

AF SYSTEM : Silvi,woodlot(pr)
LOCATION : Hawaii,Molokai
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Woodfuel,fodder
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0002

Leucaena leucocephala, to be grown commercially in large woodlots (ove r 1,000 acres) for fuelwood and leaf production in Hawaii,is discussed. Contains detailed cost/benefit information from nursery to mechanical processing. Concludes that giant leucaena could be grown profitably in Molokai as a source of fuelwood with fodder as a co-product.

AUTHOR,TITLE : Bromley,D.W.(1980).The economics of social forestry: An analysis of a proposed program in Madhya Pradesh, India.Department of Agriculture Economics,University of Wisconsin,Madison

AF SYSTEM : Silvi,woodlot(pr),silvi-past
LOCATION : India,Madhya Pradesh
TREE SPECIES : Eucalyptus spp,Gmelina arborea.Acacia spp,Prosopis
TREE PRODUCTS : Fodder,woodfuel,fruit,poles
TREE SERVICE :
CROPS :
ANIMALS : Cattle
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0027

It is emphasised that the feasibility of a program for social forestry should not only be looked upon from the village point of view, but also from the Forest Department, the State and the Central Government. Several multipurpose plantation models (grass,fodder, fuel, timber, fruit, pods, poles) are proposed for Madhya Pradesh, mixture of trees depending on the village preference. Detailed technical and economic data are provided with each model. The effect each model has upon each of the aforementioned "project actors" is examined in detail, including a social cost/benefit analysis from the public sector point of view.

AUTHOR,TITLE : Bromley,W.(1982).Economic issues in forestry as a development program in Asia. Center for resource policy studies. School of Natural Resources, College of Agricultural and Life Sciences, University of Wisconsin-Madison.

AF SYSTEM : Silvi,woodlot(cm),agri-silvi
LOCATION : Asia
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0028

A conceptual framework is presented for the evaluation of forestry activities as they relate to the social and economic development in Asia. Forestry unlike agriculture often occurs on lands owned by the government and this has its implications in formulation, design, evaluation and implementation of forestry programs.

AUTHOR,TITLE : Brook,B.A.(1973).Grass utilisation during forest e ablishment. The New Zealand Journal of Forestry 18 p141-147.

AF SYSTEM : Silvi-past
LOCATION : New Zealand, Bay of Plenty
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS : Cattle
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0052

A summary is presented of an investigation into alternative systems of grass harvesting and their comparative economics during the establishme nt of trees on an area where contour permits the use of farm machinery. The establishment period is taken as three years from planting, assu ming that after this period the area may be grazed by cattle without fe ar of damage to the trees. The systems of utilization considered were the making of hay or silage, and the cutting and carting of fresh grass . After allowing for such factors as the area covered by trees, the lo ss of fertility, efficiency of utilization of the grass grown, costs of harvesting and feeding out, the value of the grass grown was assessed in each of the three years. The profit margin was, year one, profit of $24.30/ha ,year two, break even, year three, loss of $17.30/ha.

AUTHOR,TITLE : Burbridge,P.,Dixon,J.,Soewardi,B.,(1981). Forestry a nd agriculture: Options for resource allocation in c hoosing lands for transmigration development. Report No 26, East-West Environment and Policy Institute. Hawaii.
AF SYSTEM : Silvi
LOCATION : Indonesia,Sumatra
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0080

To allocate land for agricultural development within the transmigration program, three possible sites are considered,i.e. tidal swamps, mature upland forests and alang-alang grassland. The study concludes that the oppertunity costs of using the alang-alang grassland are lowest, while benefits are still considerable. Existing forest lands are recommended for sustained yield forestry.

AUTHOR,TITLE : Burgess,R.J.(1981).The intercropping of smallholder coconuts in Western Samoa. Development Studies Centre. MADE research series 4.The Australian National University, Canberra.

AF SYSTEM : Agri-silvi
LOCATION : Samoa
TREE SPECIES : Cocus nucifera,Theobroma cacoa
TREE PRODUCTS : Nuts
TREE SERVICE :
CROPS : Banana,taro
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0037

Multi-stage linear programming has been used to model and optimize a coconut based intercropping system for small farmers in Western Samoa. It reviews some of the other methods used for optimising multi-period cropping systems. The model considers pineapple, cocoa, banana and taro (rootcrop) as understorey crops. Detailed input/output data are provided for the mixtures as well as for the individual crops.

AUTHOR,TITLE : Cummings,D.J.(1982).Farm forestry in the uplands and hills. In "Farm Management Review",6:63-68.

AF SYSTEM : Silvicult,woodlot(pr)
LOCATION : Scotland
TREE SPECIES : Picea sitchensis
TREE PRODUCTS : Construction wood
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : no
COST DATA : yes
BENEFIT DATA : no
REFERENCE NUMBER : 0004

The labour requirements and costs of planting small forestry areas on hill or upland farms are examined. No data are provided on potential revenues, which are supposed to begin in year 15.

AUTHOR,TITLE : Dykstra,D.P.(1980).Food and fuelwood, a preliminary mathematical programming analysis for an Ujamaa village in Tanzania. In "Proceedings Kenya National Seminar on Agroforestry".ICRAF.

AF SYSTEM : Agri-silvi
LOCATION : Tanzania, Southern,Mbeya Region
TREE SPECIES : Eucalypthus meliodora
TREE PRODUCTS : Woodfuel
TREE SERVICE :
CROPS : Maize,beans
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : yes
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0044

The use of linear programming is demonstrated in preparing a cropping plan for an Ujamaa village. The objective function is to optimise production of nutrients and energy requirements for humans. Eucalypthus meliodora, intercropped with either maize or beans, are considered for the plan (4-year coppicing rotation) but only eucalypthus/maize is found ack in the optimum plan.

AUTHOR,TITLE : Enabor,E.E.(1974). Socio-economic aspects of taungya in relation to traditional shifting cultivation in tropical developing countries. Rome,F.A.O.Soils Bulletin 24: 191-202.

AF SYSTEM : Agri-silvi, taungya.
LOCATION : Nigeria.
TREE SPECIES : Tectonia grandis
TREE PRODUCTS : Construction wood
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0073

Taungya is proposed as a viable replacement to the traditional shifting cultivation in Nigeria. Planting of a wider range of crops including permanent ones like cacao, coffee and oilpalm is advocated.

AUTHOR,TITLE : Etherington, D.M.,Matthews,P.J.(1983). Approaches to the economic evaluation of agroforestry farming systems. In "Agroforestry Systems Journal", Martinus Nijhoff,The Netherlands. (Forthcoming).

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0068

The economics of agroforestry systems can be approached in a purely analytical fashion with mathematical equations and diagrams explaining the principles of analysis. This paper argues that such an approach may be useful for teaching purposes, but has little practical relevance. There is an urgent need for a practical tool with which multi-disciplinary teams can assess agroforestry systems. The simplest and common approaches to economic analysis of farm management problems are various forms of budgeting. Recent advances in micro-computer technology provide the means by which the principles of partial budgeting can be adapted to the needs of agroforestry taking account of its multi-component nature, seasonal variability and long span. The paper sets out the specifications for such an approach and indicates how it might be used for cropping throughout the life span of coconuts.

AUTHOR,TITLE : Etherington,D.M.,Karunanayake,K.(1981).An economic analysis of some options for intercropping under coconuts in Sri Lanka.Sri Lanka J. Agrarian studies 2(1) :1-25.

AF SYSTEM : Agri-silvi
LOCATION : Sri Lanka, Kurunegala District
TREE SPECIES : Cocus nucifera,Theobroma cacao
TREE PRODUCTS : Nuts,cacao
TREE SERVICE :
CROPS : Pepper,coffee
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : no
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0048

An economic analysis of intercropping is presented with MULBUD, a general, interactive, multiperiod budgeting program designed for the economic assessment of perennial crop intercropping systems. Based on data from Sri Lanka different models are designed and compared. The analysis confirms the potential of intercropping under coconuts to raise incomes quite substantially.

AUTHOR,TITLE : Etherington.D.M.,Matthews.P.J.(1982).Economics for a groforestry.Agroforestry Education Workshop. Nairobi ,ICRAF.

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0055

A plea is made to include a thorough training in economics in any profe ssional education program in agroforestry. It is argued that tree orie nted research has often concentrated on maximising output of the tree c omponent which narrowed decisions down to 'within crop' allocations. I n small farmer's situation such research is not adequate because scarce resources may be used in other enterprises. Added complications with a groforestry are alternative spacing of components, time dimension and t he question of reducing risk and uncertainty.

AUTHOR,TITLE : F.A.O.(1979). Case study no 1, Philippine smallholde r tree-farming project. FAO Forestry Paper 17,supple ment 1.

AF SYSTEM : Silvi,woodlot(pr)
LOCATION : Philippine, Mindanao
TREE SPECIES : Albizzia falcataria
TREE PRODUCTS : woodfuel,pulp
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0040

A detailed ex-ante financial and economic analysis of farm woodlots of Albizzia falcataria in the Philippines is presented. These woodlots w ould be part of a small farmer's project to produce pulpwood for a pape r mill company. Farmers are to allocate about 80% (8 ha) of their land to these woodlots (8-year rotation), while the remaining 20% (2 ha) ar e to be for crop and livestock production. The rate of return computed on these woodlots is about 30%.

AUTHOR,TITLE : F.A.O.(1979). Case study no 2, Village fuelwood plan tations in Korea. FAO Forestry Paper 17, supplement 1.

AF SYSTEM : Silvi,woodlot(cm)
LOCATION : Korea
TREE SPECIES : Lespedeza spp,Amorpha spp,Alnus spp,Pinus spp
TREE PRODUCTS : Woodfuel,construction wood
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0041

A communal fuelwood plantation project in Korea is evaluated. Average plot size about 11 hectares. Seedlings are raised by Village Forestry Associations who also take care of planting, maintenance and harvesting. The species used for fuelwood are Robinia pseudoacacia, Alnus firmus and A. hirsuta, Lespedeza and Amorpha species. Some timber species were included as well i.e. poplar, larch and pine. Since fuelwood is not traded, opportunity prices in terms of the value of agricultural residues and coal are used.

AUTHOR,TITLE : Faircloth,V.L.(1976). Cost and returns for beef cattle enterprises on Southern pine timberlands. Msc thesis Virginia Polytechnic Institute and State University.

AF SYSTEM : Silvo-past
LOCATION : U.S.A.,Southern States
TREE SPECIES : Pinus spp
TREE PRODUCTS : Construction wood
TREE SERVICE :
CROPS :
ANIMALS : Cattle
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0025

An economic analysis was performed on cattle investments on timber resources in South Eastern United States. Costs and returns were determined. A computer program was written to simulate investments for a wide range of biological and market conditions management recommendations. Investments were presented in budget format with investment life equal to the timber rotation period. Capital requirements for a herd of 25 to 51 cows on 500 acres of timber plantation ranged from $10,500 to $37,500. Investments with positive return were paid back in 9 to 13 years. For average investments, IRR varied from negative to 17.7 percent. NPV, EAV and B/C, based on an 8 percent interest rate, respectively had values of negative to $41.73 per acre, negative to $3.91 per acre and less than 1.00 to 1.5. Eighteen variables that were initially held were then individually varied. Investment returns were sensitive to most of these c

AUTHOR,TITLE : Ferguson,I.S.,Reilly,J.J.(1978).The economics of joi nt agriculture/forestry enterprises. In "Proceedings Workshop Integrating Agriculture and Forestry". CSI RO, Perth,Western Australia.

AF SYSTEM : Silvi,silvi-past,woodlot(pr)
LOCATION : Australia
TREE SPECIES : Pinus radiata
TREE PRODUCTS : Poles,construction wood
TREE SERVICE :
CROPS :
ANIMALS : Cattle
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0029

An overview of the Australian literature on the economics of agrofores try is presented, i.e. apiculture, silvi-pasture and farm woodlots. It proceeds with an example of a silvi-pastoral system integrating beef pr oduction and wood production. The example contains detailed input/outp ut data as well as grazing capacities over time.

AUTHOR,TITLE : Filius,A.M.(1981).Economic aspects of agroforestry. In"Viewpoints on Agroforestry" ed. K.F.Wiersum. Agr. cultural University Wageningen,The Netherlands.

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0007

The economics of combining forestry and agriculture using production po ssibility curves, iso-revenue lines and the equi-marginality principles are described. This is followed by a discussion of the main production resources in relation to agroforestry and the contribution agrofores try can make to achieve socio-economic objectives,i.e. improve economic efficiency, improve conditions of the poorer members of society (basic needs approach), improve environmental conditions and land use.

AUTHOR,TITLE : Gauchon,N.J.,Hoekstra,D.A.,Wiersum,K.F.,Van Gelder, .(1976). Some aspects of watershed management econo ics. Field termination document No 7. UNDP/FAO Upper Solo watershed management and upland development oject, Indonesia.

AF SYSTEM : Silvi-past
LOCATION : Indonesia, Central Java
TREE SPECIES : Pinus mercusii,Albizzia falcataria,Eucalyptus spp.
TREE PRODUCTS : Construction wood,woodfuel,naval
TREE SERVICE : Soil erosion
CROPS : Napier grass
ANIMALS : Cattle
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0036

Amongst others, input/output data as well as an economic analysis of cut and carry silvo-pastoral system are given for small farms in Centr al Java, Indonesia. These systems are proposed as an alternative for th e steeper slopes presently under annual cultivation.

AUTHOR,TITLE : Gisz,P.,Sar,N.L.(1980).Economic evaluation of an agr oforestry project. Misc bulletin no 33. Department o f Agriculture,New South Wales.Australia.

AF SYSTEM : Silvi-past
LOCATION : Australia,New South Wales
TREE SPECIES : Pinus radiata
TREE PRODUCTS : Construction wood
TREE SERVICE :
CROPS :
ANIMALS : Sheep
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0022

The potential role of forestry within a farm in Australia is discus sed. It presents a case study on a silvi-pastoral system of improved p asture (sheep) between wide-spaced tree rows of Pinus radiata, grown f r timber. Detailed cost/benefit analyses are presented and it conclude that the silvi-pastoral model gives a better result than the existing sheep grazing enterprise. In comparing the two alternatives, the auth rs assume a higher discount rate for the silvi-pastoral model than the existing sheep grazing enterprise, because of the higher risk involved.

AUTHOR,TITLE : Glover,N.(1981). Coffee yields in a plantation of Coffea arabica var. catura shaded by Erythrina poeppigiana with and without Cordia alliodora. CATIE informe technico no 17.

AF SYSTEM : Agri-silvi
LOCATION : Costa Rica,Canada Town
TREE SPECIES : Cordia alliodora, Erythrina poeppigiana
TREE PRODUCTS : Construction wood
TREE SERVICE : Micro climatic
CROPS : Coffee
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0059

In order to quantify the effect of Cordia alliodora on coffee yields, a study was initiated in a plantation of Coffee arabica var catura, shaded by Erythrina poeppigiana with and without Cordia alliodora. During the 2-year study period coffee yields of individual bushes were measured. First-year results showed a 47 percent higher coffee yield in the association with C. alliodora. However, second-year yields were 22 percent lower with C. alliodora. Considering the annual volume increment of C. alliodora, the estimated potential gross income was higher from the association with Cordia alliodora.

AUTHOR,TITLE : Grinnell,H.R.(1977).A study of agri-silviculture potential in West Africa. IDRC, Ottawa, Canada.

AF SYSTEM : Agri-silvi,shift-cult,taungya
LOCATION : West Africa.
TREE SPECIES : Gmelina arborea,Elaeis guineensis
TREE PRODUCTS : Pulp,construction wood
TREE SERVICE : Soil improvement
CROPS : Yam,maize,cassava
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0016

Three traditional forms of producing food in the humid tropical zones of West Africa,i.e. shifting cultivation (with and without planted fallow) and taungya are discussed. It stresses that taungya should not only be evaluated from the forestry service point of view but also from the farmer's point of view. To decrease the rate of soil degradation some alternatives to the above-mentioned systems are discussed,i.e. field-crops alternated with planted forest fallow (agri-silviculture) and field crops with natural bush fallow with permanent oil palm upperstorey (shifting cultivation). Average annual costs and benefits of these models are included.

AUTHOR,TITLE : Gupta,T.,Mohan,D.(1982). Economics of trees versus a nnual crops on marginal agricultural lands. Oxford & Ibh, New Delhi, Bombay

AF SYSTEM : Silvi-past,woodlot(pr)
LOCATION : India,Rajasthan
TREE SPECIES : Acacia tortilis,Albizzia lebbek,Prosopis spp,Zizyp
TREE PRODUCTS : Fodder,woodfuel,fruit,poles
TREE SERVICE :
CROPS :
ANIMALS : Cattle
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0033

According to the authors, substantial areas presently under cropping a re in fact unsuitable for rainfed seasonal crops. Silvi-pastoral use h s been identified as one alternative and an economic comparison of the two forms of use of the fragile natural resources made. The study concl udes that individual operators as well as society as a whole stand to g ain by a shift to tree crops. Detailed input output studies are present ed for several tree species in the hot arid zones of Rajasthan.

AUTHOR,TITLE : Gupta,T.,Sambrani,S.(1978). Farming systems in hill areas. Control of shifting cultivation: The need for an integrative approach and systematic appraisal. I ndian Journal of Agricultural Economics. Vol 33(4):1 -8.
AF SYSTEM : Silvi,woodlot
LOCATION : India
TREE SPECIES : Bamboo spp
TREE PRODUCTS : Bamboo
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0039

Some operational criteria which must be met by alternatives to shifting cultivation are developed,i.e. per capita income must be greater, pro gram pays for itself on maturity, land productivity at least as great as under shifting cultivation, internal rate of return greater than soci l rate of return, availability wage good at least as much as before. T erracing and plantation of rubber, coffee and cardamon don't seem to m et such criteria. Bamboo plantation appear to have a better potential

AUTHOR,TITLE : Harou,P.A.(1983).Economic principles to appraise a oforestry projects. In "Agricultural Administration 12:127-139

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0006

A brief description of the various types of agroforestry projects and the basic economic principles to take into consideration for evaluating these systems is given. It stresses that there is a greater dependability of returns as compared to sole cropping. This could be reflected with a risk analysis which would give a lower coefficient of variation for returns from agroforestry systems as compared to monocropping systems.

AUTHOR,TITLE : Hoare,P.W.C.(1981). Extension methodology and village woodlot development. Highland agriculture and social development project.T.A.W.L.D..Chiang Mai, Thailand

AF SYSTEM : Silvi,woodlot(cm)
LOCATION : Chiang Mai, Thailand
TREE SPECIES : Acacia auriculiformis
TREE PRODUCTS : Woodfuel,construction wood
TREE SERVICE : Erosion control
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0065

Data are provided on fertilizer and estimated labour input requirements per rai (1 ha = 6.25 rai) of an Acacia auriculiformis village woodlot (400 trees/rai). Estimated output of poles in years 10 and 20 as well as fuelwood output are also presented.

AUTHOR,TITLE : Hoekstra,D.A. (1983). Choosing the discount rate fo analysing agroforestry systems/technologies from a farmer's point of view. Working Paper No 9. ICRAF.

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 007B

The rate at which future net benefits from agroforestry systems/techno ogies should be discounted from a farmer's point of view, is discusse The paper puts particular emphasis on the small farm situation in whi h the valuation of future benefits often has to be measured in terms o the value of consumption foregone in the present.

AUTHOR,TITLE : Hoekstra,D.A.(1982).Planning fuelwood production o a tobacco farm. Some economic considerations. In "P oceedings ICRAF/BAT Agroforestry Workshop".ICRAF,Na robi.

AF SYSTEM : Agri-silvi,silvi
LOCATION : Kenya
TREE SPECIES :
TREE PRODUCTS : Woodfuel
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 005B

Tobacco farms need sizeable quantities of fuelwood for curing tobacco. Planting of fuelwood trees is therefore encouraged and this paper loo at how to minimise costs to produce the required amounts.

AUTHOR,TITLE : Hoekstra,D.A.(1982).Review of economic literature relevant for agroforestry. Agroforestry Education Workshop, Nairobi,ICRAF.

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0056

Basic economic textbooks and articles dealing with the economics of agroforestry are reviewed for inclusion as reference material in professional agroforestry education programmes.

AUTHOR,TITLE : Hoekstra,D.A.(1982).The use of economics in agroforestry. Working Paper No 2. ICRAF.

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0057

Agroforestry development takes 3 phases,i.e. diagnosis of problems, design of technologies and development of technologies. The role economics (methods and tools) can play in each of these phases is discussed.

AUTHOR,TITLE : Hoekstra,D.A.(1983). Leucaena leucocephala hedgerows intercropped with maize and beans. Working Paper No 3. ICRAF.

AF SYSTEM : Agri-silvi,alley-crop
LOCATION : Kenya,Machakos
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Mulch,woodfuel
TREE SERVICE :
CROPS : Maize,beans
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0024

The use of a micro computer program (MULBUD) for the analysis of a leucaena/maize/beans alley cropping system for the semi-arid areas in Kenya is demonstrated. It shows that yields of the traditional maize/beans mixture can be increased significantly and that per unit area labour requirements for field preparation and weeding are reduced with the introduction of the alley cropping system.

AUTHOR,TITLE : Hofstad,O.(1978).Preliminary evaluation of the taungya system for combined wood and food production in North Eastern Tanzania. Record No 2 Division of Forestry, Faculty of Agr, For and Vet Science, University Dar es Salaam, Tanzania.

AF SYSTEM : Agri-silvi,taungya
LOCATION : Tanzania,North Eastern
TREE SPECIES : Pinus patula
TREE PRODUCTS : Construction wood
TREE SERVICE :
CROPS : Maize,beans
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0032

An evaluation of the taungya system as used in Tanzania is presented. Several options in planting Pinus patula for construction wood production and maize and beans are considered. Since the economic benefits of the systems are high, it is argued that the administration of the taungya system could be altered to make it politically more acceptable. The study contains detailed cost/benefit analyses of each proposed model.

AUTHOR,TITLE : Hosier,R.(1982). Social benefit-cost analysis of fuelwood development projects in Kenya. The Beijer Institute, Stockholm, Sweden.

AF SYSTEM :
LOCATION : Kenya
TREE SPECIES :
TREE PRODUCTS : Woodfuel
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0035

A review is given of some of the literature on project evaluation as well as a methodological framework for the evaluation of fuelwood projects. It stresses the need for a financial, economic and social (also called social cost benefit) analysis to account for the social goals of society. For the latter analysis it introduces the merit want concept for basic need goods. For the economic analysis, several methods are suggested to value fuelwood. It concludes by deriving parameters required for the 3 aforementioned analyses for Kenya.

AUTHOR,TITLE : Hosier,R.,Van Gelder,B.Van Den Donk, W.(1982) Fuelwood production in developing countries:towards an appropriate forest technology. The Beijer Institute,Stockholm,Sweden.

AF SYSTEM : Silvi,woodlot(pr)
LOCATION : Kenya Highlands
TREE SPECIES : Eucalyptus spp,Calliandra calothyrsus
TREE PRODUCTS : Woodfuel
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0009

The need for appropriate forest technology as a solution to the rural fuelwood shortage in developing countries is addressed. Appropriate fuelwood production systems should be developed, based on the principles of coppicing and pollarding, short rotation periods, and producing small diameter fuelwood sticks. A hypothetical fuelstick project is discussed to show that not only are such systems possible, but they can be economically superior to conventional solutions.

AUTHOR,TITLE : ILCA.(1980).Economic aspects of browse developpeat ILCA bulletin.

AF SYSTEM : Silvi-past,protein bank
LOCATION : Africa,Chili
TREE SPECIES : Prosopis spp,Acacia spp, Atriplex spp,Leucaena leucocephala,Parkinsonia aculeata
TREE PRODUCTS : Fodder
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0017

Economic feasibility studies of multipurpose browse trees are presented . Includes an attempt to evaluate fodder on the basis of its nutrient value. Woodlots of the following species are evaluated; Atriplex, Acacia cyanophylla, Phyllodineous acacia, Acacia senegal, Acacia albida, Prosopis spp, Parkinsonia aculeata and Leucaena leucocephala.

AUTHOR,TITLE : Kalla,J.C.,Chand,G.,Vyas,D.I.(1975).Economics of commercial fuel plantation crops in the arid zone of Rajasthan. Agricultural situation in India. Vol.40(4)

AF SYSTEM : Silvi,woodlot
LOCATION : India,Rajasthan
TREE SPECIES :
TREE PRODUCTS : Albizzia lebbek,Azadirachta indica,Prosopis spp
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0050

Four popular tree species are analysed,i.e. Albizzia lebbek , Azadirachta indica, Prosopis juliflora and Acacia tortilis which have been found fairly suitable for commercial production of fuel on degenerated land in arid areas. Cost and benefit data per hectare are presented for the period 1963 - 74.

AUTHOR,TITLE : Karunanayake, N. (1982). An economic assessment of intercropping under coconuts in Sri Lanka. [illegible] esis for Australian National University, Canberra.

AF SYSTEM : Agri-Silvi
LOCATION : Sri Lanka, Colombo, Gampaha and Kegalla Districts
TREE SPECIES : Cocus nucifera
TREE PRODUCTS : Nuts.
TREE SERVICE :
CROPS : Ginger,turmeric, betel, pepper, coffee
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0067

The economics of coconut-based intercropping models is examined with the help of HOLBUD. Coffee, pepper, betel, turmeric and ginger are some of the understorey crops introduced in the different models. Mature coconuts had the lowest SNPV and labour requirements. Models containing early yielding intercrops such as betel, ginger and turmeric which require higher labour inputs give higher SNPV's at higher personal discount rates and are more suitable for farmers who operate small and medium size farms and have a high potential family-labour availability. Intercrop models with pepper and coffee, which give a higher return for labour and higher SNPV's at low discount rates are more suitable for larger farmers who have low personal discount rates. A method of replanting the less productive 50% of the palms is proposed to enable intercropping throughout the life span of coconuts.

AUTHOR,TITLE : Kasturi,P.(1981). The ecologic/socio-economic interface of biofuel development in Hawaii: Silviculture on the slopes of Mauna Kea and Mauna Loa. Reprint no. 37, East-West Environment and Policy Institute, Hawaii.
AF SYSTEM : Silvi
LOCATION : Hawaii
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE : Micro climatic,soil improvement
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0079

The environmental impact of different land uses i.e. conservation forestry, agriculture and tree-farming for energy, are computed. Costs are assigned to the different land uses on the basis of groundwater recharge loss, groundwater consumption, soil loss, sedimentation and air pollution.

AUTHOR,TITLE : King,K.F.S.,(1968). Agri-silviculture (the Taungya System)Ibadan.

AF SYSTEM : Agri-silvi
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0069

On the basis of a world-wide survey the economic advantages to the forester and to the farmer of agri-silviculture practices are presented.

AUTHOR,TITLE : Lagemaan.J.,Heuveldop.J.(1982).Characteristics and evaluation of agroforestry systems: The case of Acosta-Puriscal,Costa Rica, CATIE.

AF SYSTEM : Agri-silvi
LOCATION : Costa Rica,Acosta-Puriscal
TREE SPECIES : Inga spp,Gliricidia sepium,Erythrina spp,Citrus sp
TREE PRODUCTS : Construction wood,woodfuel
TREE SERVICE : Soil improvement,micro climatic
CROPS : Coffee
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0018

An overview of existing agroforestry systems in Acosta-Puriscal, Costa Rica is given,i.e. coffee in combination with trees, pastures in combination with trees, trees in life fences. The paper proceeds with explaining the procedure for evaluating these systems, followed by a comparative evaluation of two agroforestry systems,i.e. coffee + shade trees and coffee + shade trees + fruit trees (undiscounted).

AUTHOR,TITLE : Learmonth,J.H.,Rabette,J.S.(1978). The economic of agroforestry:A preliminary analysis.In "Proceedings Integrating Agriculture and Forestry". eds. Rummery, CSIRO,Perth, Western Australia.

AF SYSTEM : Silvi-past
LOCATION : Australia,Victoria
TREE SPECIES : Pinus spp
TREE PRODUCTS : Construction wood,pulp
TREE SERVICE :
CROPS :
ANIMALS : Sheep
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0026

The integration of an open-spaced pine plantation on grazing land in the Ballarat districts of Victoria, Australia with a wool producing flock of wethers grazing the pasture component of the system is examined in this paper. The technical and economic data are derived from best estimates of people involved in both the Forest Department and the Agriculture Department in Victoria. As such it is an explanatory analysis aimed at establishing the dimensions of capital and operating costs and the potential returns.It also indicates how sensitive the results could be to likely changes in the physical or financial parameters.

AUTHOR,TITLE : Lee,K.A.,Ng,L.H.,Goh,C.L.(1976).Economics of poultry rearing under rubber. Rubber Research Institute of Malaysia, Kuala Lumpur.

AF SYSTEM : Agri-silvi-past
LOCATION : Malaysia
TREE SPECIES : Hevea spp
TREE PRODUCTS : Latex
TREE SERVICE :
CROPS :
ANIMALS : Chickens
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0030

Intercropping can be done during the first years of rubber cultivation. After that, owing to the shading effect of the canopy, intercropping is no more economically feasible. Instead, introduction of poultry under rubber trees is feasible. In this paperthe cost of production and profitability of poultry rearing are examined. The authors recommend it as a profitable enterprise for all rubber smallholdings.

AUTHOR,TITLE : Loale,C.I.A.,Green,J.,Frank,P.J.,Savory,R.,V[illegible] (1978).Production of leucaena meal in Malawi. [illegible] P./F.A.O. Project MLW/75/020.

AF SYSTEM : Agri-silvi-past
LOCATION : Malawi,Lower Shire Valley
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Fodder
TREE SERVICE :
CROPS :
ANIMALS : Chickens,cattle
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0049

Leucaena meal production for poultry and cattle in Malawi is discussed. It suggests the development of the lower Shire Valley for meal production at a nucleus estate and associated small holdings. Based on field experiences and additional analysis, cost and benefit data are presented for smallholder production. In the tree establishment phase, maize is used as an intercrop.

AUTHOR,TITLE : Lowe,R.G.(?).Farm forestry in Nigeria. Federal Department of Forest Research, Ibadan, Nigeria

AF SYSTEM : Agri-silvi,taungya(go)
LOCATION : Nigeria,Southern
TREE SPECIES : Gmelina arborea,Terminalia superba,Tectona grandis
TREE PRODUCTS : Construction wood,pulp
TREE SERVICE :
CROPS : Cassava,maize,yam
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0015

The taungya system is described from the forest service and the peasant's point of view. It contains cost/benefit data on Gmelina arborea, Tectona grandis and Terminalia spp taungya systems.

AUTHOR,TITLE : Macbrayne,C.G (1982).Agroforestry for upland farms? In "Scottish forestry" 36(3):195-206.

AF SYSTEM : Silvi-past
LOCATION : Scotland
TREE SPECIES : Larch hybrid
TREE PRODUCTS : Poles,constuction wood
TREE SERVICE :
CROPS :
ANIMALS : Sheep
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0003

A silvi-pastoral system for the Scottish Highlands is examined using 3- hectare plot with hybrid larch as example. Over a 16-year rotation, the agricultural value of the pasture is estimated at 40% as compared to open pasture. The trees at the end of year 16 are assumed to be used for fence posts and fuelwood. Study contains input and output data.

AUTHOR,TITLE : Maydell,H.J. von (1981). Criteria for planning and evaluation of agroforestry projects. In "Agroforestry" CATIE, Costa Rica.

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0076

A systematic approach is proposed for planning and evaluating agroforestry projects. This approach involves posing the following questions: what is the state of affairs (analysis of development and situation trends)? ; what is the objective (definition of target and tasks)? ; how can it be achieved (analysis of procedure)? ; does it pay (evaluation)?

AUTHOR,TITLE : Mindajao,R.M.(1979).The economics of agroforestry. In "Proceedings of Agroforestry Workshop",Philippine Council for Agriculture and Resources Research, Los Banos, Laguna, Philippines.

AF SYSTEM : Silvi,woodlot(pr)
LOCATION : Philippines
TREE SPECIES : Albizzia falcataria
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0061

Considerations about the implications of tree farming using fast-growing forest species. It can be a financially sound investment if and only if pertinent data indicate that buyers' prices at conversion time will be at least equal to the farmer's per unit cost-price.

AUTHOR,TITLE : Mishra,J. (1979). Agri-silviculture - A system holding great promise for social forestry in Bihar. The Indian Forester, 105(9):638-643.

AF SYSTEM : Agri-silvi taungya (PR)
LOCATION : India,Bihar.
TREE SPECIES : Tectona grandis, Dalbergia sissoo
TREE PRODUCTS : Timber
TREE SERVICE :
CROPS : Maize, ragi, rice.
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0072

Experiments with the taungya systems are layed out in Manda on 2.5 ha plot teak and 3.5 ha sissoo. Yield, benefit and cost data of the first year are presented.

AUTHOR,TITLE : Montgolfier-Kouevi.C. de.,Houerou,H.N. le.(1980). St udy on the economic viability of browse plantations in Africa. In"Browse in Africa",ILCA.

AF SYSTEM : Silvi-past,protein bank
LOCATION : Senegal,Sudan,Cape Verde,Malawi,Sahel
TREE SPECIES : Atriplex spp,Acacia spp,Prosopis spp.Leucaena leuc ocephala
TREE PRODUCTS : Fodder
TREE SERVICE : Soil improvement,micro climatic
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0054

Evaluations of browse plantations in Africa. Cost and benefits are dra wn from concrete experiences in a great many countries in Africa. If s uch experiences were not available, additional calculations were made t o reflect local circumstances as much as possible.

AUTHOR,TITLE : Mruthyunjaya(1981).Benefit-cost considerations in a roforestry. In proceedings " Workshop Summer Institu te on Agroforestry of Arid and Semi-arid Zones", CAZ RI, Jodhpur India.

AF SYSTEM : Agri-silvi,taungya(pr)
LOCATION : India,Gujarat
TREE SPECIES : Eucalyptus spp

TREE PRODUCTS : Pulp,woodfuel
TREE SERVICE :
CROPS : Cotton
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0020

The use of cost/benefit analysis for evaluating agroforestry projects i s emphasized. Explains that costs and benefits are subdivided into tang ible and intangible ones. The latter one can be expressed in monetary t erms. It concludes with an example on the economics of a eucalyptus wo odlot, established with cotton intercropping during the first year.

AUTHOR,TITLE : Nesargi,V.S.(1978) Poplars, a tree crop for economic regeneration of the tropics. Eighth World Forestry Congress FFF/7-9,Jakarta, Indonesia.

AF SYSTEM : Agri-silvi
LOCATION : India,Himalayan
TREE SPECIES : Populus deltoides
TREE PRODUCTS : Pulp
TREE SERVICE :
CROPS : Rice,wheat
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0051

Based on the past 15 years' experience in growing poplars in India it s stated that the species is suitable in the tropics and the sub-tropic s, for cultivation as a source for industrial soft wool and also for p lpwood. Cost and benefit data for an agri-silvicultural model yield g matchwood, rice and wheat have been presented over a project life of 15 years. Total area planted 3,750 hectares.

AUTHOR,TITLE : Ngambeki,D.S.(1982). Economic evaluation of alleycr pping. Leucaena-maize-cowpea. 1982 Annual Report.I .T.A.,Nigeria.

AF SYSTEM : Agri-silvi,alley-crop
LOCATION : Nigeria,Ibadan,I.I.T.A.
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Mulch
TREE SERVICE :
CROPS : Maize,cowpea
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0046

Economic evaluation data over two crop seasons are presented on alley ropping trials of Leucaena leucocephala, maize and cow peas, with and ithout fertilizers. In all cases the addition of leucaena only gives etter economic returns than leucaena-nitrogen.

AUTHOR,TITLE : Openshaw,K.(1982). Costs and benefits of proposed tree planting programme for satisfying Kenya's woodfuel energy requirements. Beijer Institute, Stockholm, Sweden.

AF SYSTEM : Agri-silvi,silvi-past,woodlot(pr)
LOCATION : Kenya
TREE SPECIES : Prosopis spp,Leucaena leucocephala,Sesbania grandiflora
TREE PRODUCTS : Woodfuel,fodder,mulch
TREE SERVICE :
CROPS : Maize
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0023

Woodfuel is compared to other sources of energy in Kenya. It concludes that woodfuel is much cheaper than the conventional energy sources, while the cost of foreign exchange of woodfuel are also lower. Cost of growing woodfuel by the Forestry Department in Kenya is said to be more expensive than in Tanzania because of low task rates. Detailed input/output models are presented for woodfuel plantations (government operated), a taungya system, agri-silvi farm model with different rotation periods, and agri-silvi-pastoral systems. Proposed species for the latter are Prosopis spp and Leucaena spp. Recommended short rotation fuelwood species are Calliandra spp and Sesbania spp.

AUTHOR,TITLE : Openshaw,K.,Morris,J.(1979).The socio-economics of agroforestry.In "Proceedings International Cooperation in Agroforestry." eds.Chandler & Spurgeon,ICRAF.

AF SYSTEM : Silvi,woodlot(pr),woodlot(cu)
LOCATION : Tanzania
TREE SPECIES :
TREE PRODUCTS : Woodfuel,poles
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0013

The establishment of woodlots near centres of demand are discussed. It contains data on fuelwood requirements, input/output data of a 10-year rotation on 0.5-ha private woodlots for fuelwood and poles. The article mentions some examples of successful agroforestry projects on a communal basis in Asia (China, North Korea). It further discusses land tenure and present land use as bottlenecks to the introduction of agroforestry in Africa. It argues that measures should be taken to legalise individual land ownership to make agroforestry systems profitable on paper, feasible in practice.

AUTHOR,TITLE : P. Kunstadter, E.C.Chapman and S. Sabhasri (eds.) (1978). Farmers in the forest. Economic development and marginal agriculture in Northern Thailand. Honolulu, The University Press of Hawaii.

AF SYSTEM : Agri-silvi
LOCATION : Thailand
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0074

This book brings together studies by administrators, agronomists, anthropologists, forest ecologists, geographers and jurists, who describe a variety of swidden systems and their effect on soil, forest, society, and economy. They point to conflicts between traditional farming systems and modern legal and administrative constraints now being imposed, and they describe special and technological conditions that contribute to a marginal, stagnant upland economy, increasing socio-economic disparities with the lowlands, and the serious ecological consequences of these conditions. Several possible solutions are suggested to solve these problems.

AUTHOR,TITLE : P.K.Ramachandran Nair (1979). Intensive Multiple Cropping with Coconuts in India: Principles, Problems and Prospects. Berlin and Hamburg, Verlag Paul Parey, Beiheft zur Zeitschrift fur Acker und Planzenbau 6.

AF SYSTEM : Agri-silvi
LOCATION : India, Kerala.
TREE SPECIES : Cocus nucifera, Theobroma cacao
TREE PRODUCTS : Coconuts.
TREE SERVICE :
CROPS : Cassava,yani,potato,banana,pineapple,black pepper
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0071

This book contains a chapter on the agro-economics of coconut intercropping under small farmers' conditions. It has detailed physical and monetary input and output data.

AUTHOR,TITLE : PCARR,1980.IPIL-PILL leafmeal production and utilization. Vol 2 No 6/80, Philippine Council for Agriculture and Resources Research,Los Banos, Laguna, Philippines

AF SYSTEM : Silvi-past,protein bank
LOCATION : Philippines
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Fodder
TREE SERVICE :
CROPS : Guinea grass
ANIMALS : Cattle,poultry,swine
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0062

The Philippine Association of Feed Millers Inc. developed a financing system for small farmers to produce leucaena as feed for cattle, poultry and swine. The maximum loan to a farmer as well as the cost and return analysis of leucaena leaf meal production per hectare are presented.

AUTHOR,TITLE : Picornell,P.M.(1982).The PICOP-agroforestry project, socio-economic and forestry aspects. In "Forestry and Development in Asia",Bangalore,India.

AF SYSTEM : Silvi,woodlot(pr)
LOCATION : Philippines
TREE SPECIES : Albizzia falcataria, Eucalyptus deglupta
TREE PRODUCTS : Pulp
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0064

Comparison of the returns per hectare by planting trees against planting rice at Bislig, Philippines in 1973.

AUTHOR,TITLE : Raintree,J.B.(1981).Bioeconomic considerations in the design of agroforestry intercropping systems.ICRAF.

AF SYSTEM : Agri-silvi,alley-crop
LOCATION : Nigeria,I.I.T.A.
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Mulch
TREE SERVICE :
CROPS : Rice
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0010

Economic principles of joint production of annuals and perennials are described in this paper. It stresses that evaluation of agroforestry systems should not be based solely on per unit area measures since these would only prove useful if land is the scarcest production factor. It demonstrates the use of linear programming to determine the area of alleys in a leucaena-rice alley cropping system.

AUTHOR,TITLE : Roam J. (1982). A research agenda for social forestry. The International Tree Crops Journal, 2(1):25-59.

AF SYSTEM :
LOCATION :
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0070

Priorities for social forestry research are considered under three main headings. Systems Design, The economics of Design and Management (EDM) and the Role of Government. The EDM focusses on the development of criteria for the selection of those cropping systems which will produce sufficient net economic benefits in different social and ecological conditions to justify investment requirements.

AUTHOR,TITLE : Romm,J.(1980) Assessing the benefits and costs of social forestry projects. In "Indian forester" 106(7): 445-455

AF SYSTEM : Silvi,woodlot(cm)
LOCATION : India
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0019

Discusses some of the theoretical concepts for analysing communal forestry projects. It states that the objectives of such projects are two-fold: to save future forest yield and to improve village well-being. A relationship needs therefore to be established between plantation productivity and forest land savings. These savings have to be valued in terms of benefits foregone (including watershed protection) from now into the future. It elaborates on the costs and benefits of social forestry projects using the opportunity cost principle. It also proposes a three-tier mode of analysis to account for the distributive requirements of project viability: benefit/cost estimation for the project as a whole, for the project as perceived separately by participating villages and departments and for the project as perceived separately by groups of villagers involved.

AUTHOR,TITLE : Sain,K.(1978).Economics of shifting cultivation.In "Indian journal of agricultural economics" 33(4):8-13

AF SYSTEM : Agri-silvi,shift-cult
LOCATION : India,North Eastern Hills
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE : Soil improvement
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0012

Some of the economic characteristics of shifting cultivation as practised in North East India are presented.

AUTHOR,TITLE : Shaikh,A.M.,Larson,P.S.(1981). The economics of Vil age-level forestry: A methodological framework: fin l report. Africa Bureau, USAID, Washington, DC.

AF SYSTEM : Agri-silvi,woodlot(cm)
LOCATION : Mali
TREE SPECIES :
TREE PRODUCTS : Woodfuel,mulch
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0031

A framework is given for analysing village-level forestry programs. It identifies three different levels of economic analysis,i.e. the investors' perspective, the social perspective and the project efficiency perspective (replicability). The latter aspect is broken down in an allocation problem (what should the public sector be prepared to contribute to any given project) and a budgetary problem (what can the public sector contribute). Guidelines are provided with regard to the valuation of inputs and outputs for the different analyses. Two case studies are provided -one on a community woodlot for fuelwood production and one on individual tree planting on farms.

AUTHOR,TITLE : Sivanandam,K.,Kandaswami,A.,Ramaswamy,C.(1981).Returns to investments in forest plantations. In "Financing Agriculture" 13(1):21-26.

AF SYSTEM : Silvi,woodlot(pr)
LOCATION : India,Tamil Nadu
TREE SPECIES : Anacardium occidentale,Eucalyptus spp,Casuarina spp
TREE PRODUCTS : Fruit,woodfuel,pulp
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0005

An analytical framework for evaluating woodlots of cashew, eucalyptus and Casuarina spp is discussed. The article further examines the economic and financial viability of investing in these plantation crops. Data were collected in the Pudukkottai District in Tamil Nadu from existing stands (private as well as government-owned). Eucalyptus is assumed to be harvested after 8, 9 or 10 years, Casuarina spp after 12 years, while cashew is harvested from year 3 to 35. Cashew gave the highest net present value

AUTHOR,TITLE : Srivastava,B.P.,Pant,M.M.(1979).Social forestry on cost-benefit analysis framework.In "Indian Forester " 105(1):2-35.

AF SYSTEM : Silvi,agri-silvi,woodlot,taungya
LOCATION : India,Gujarat,Rajasthan,Tamil Nadu
TREE SPECIES : Eucalyptus spp
TREE PRODUCTS : Woodfuel,pulp
TREE SERVICE :
CROPS : Cotton,wheat,tobacco,napier grass
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0011

Different social forestry components in India are described,i.e. farm forestry (Eucalypthus woodlot on private farms , intercropped during first 4 years), forestry on community land and along road sites and urban forestry. It is suggested to use a "with" and "without" social forestry comparison to measure the impact of such projects. The article contains detailed input/output data on Eucalyptus woodlots.

AUTHOR,TITLE : Tran van Nao.(1978). Agrisilviculture, joint production of food and wood. Position paper, Eighth World Forestry Congress, Jakarta.

AF SYSTEM : Agri-silvi,shift-cult,taungya
LOCATION : Nigeria,Indonesia,China,Thailand
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0042

Systems of agri-silviculture (mainly shifting cultivation and taungya) are described as practised in different countries, especially Nigeria, Thailand, Indonesia and China. These descriptions contains some yield and benefit data. Since very little food is produced by taungya systems, ways and means are considered to reduce the peasants' frustration with the system. It is argued that part of the cost-saving effect of the taungya system for the Forestry Department, which is in the order of 60 %, should be passed on to the peasants.

AUTHOR,TITLE : University of Michigan. (1982). Agroforestry in Nige r: Economic and social analysis. Research proposal. Center for Research on Economic Development and Sch ol of Natural Resources. Ann Arbor: The University o f Michigan.
AF SYSTEM : Silvi,woodlot(pr),woodlot(cm)
LOCATION : Niger
TREE SPECIES :
TREE PRODUCTS :
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : no
YIELD DATA : no
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0077

A methodological approach for evaluating woodlots is proposed for an ag roforestry research project in Niger. It addresses in a systematic way :how do (or could) woodlot activities fit into the overall economic sit uation of the farming system and: what are the critical social, organis ational and institutional factors influencing adoptation of woodlot act ivities by individuals and communities.

AUTHOR,TITLE : Vega,L.(1979).Profit-making capacities of regular pl antatations as compared with the agro-silvicultural model: Surinam. In "Proceedings Workshop Agroforestr y Systems in Latin America", Turrialba, Costa Rica. UNU & CATIE.
AF SYSTEM : Agri-silvi, taungya(go)
LOCATION : Surinam
TREE SPECIES : Cordia alliodora, Eucalyptus deglupta
TREE PRODUCTS : Woodfuel,construction wood, poles
TREE SERVICE :
CROPS : Rice, banana
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0060

For the development of methods of forest regeneration in the wet, lowl nd tropics, particularly under the environmental conditions obtaining i n Surinam, the investment plan calls for a minutious examination of the costs of regeneration, the productivity of the site, and the expected returns from primary products (thinned and final harvest timber), and o ther, secondary products. Only the best sites using commercially valua le rapid, growth species can justify the intensive investment in regen ration methods. Agri-silvicultural models deserve serious consideration

AUTHOR,TITLE : Vergara,N.T.(1982).Economic evaluation of agroforestry projects.Working Group on Agroforestry Environment and Policy Institute East-West Center, Honolulu,Hawaii,U.S.A.

AF SYSTEM : Agri-silvi,alley-crop
LOCATION : Hawaii
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Mulch, woodfuel
TREE SERVICE : Soil improvement
CROPS : Maize
ANIMALS :
METHODOLOGY : yes
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0008

Some guidelines are provided on how to evaluate agroforestry land-use systems in general terms as well as the techniques available for this purpose. It includes an example of an alley-cropping system of Leucaena leucocephala and maize on a 2-hectare up-land farm. The example gives physical as well as financial data and it concludes that alley cropping is more beneficial than the traditional cropping pattern of 2 maize crops/year.

AUTHOR,TITLE : Verinumbe,I.(1981). Economic evaluation of some zero-tillage systems of land management for small-scale farmers in South-Western Nigeria. Thesis for Forest Resources management, University of Ibadan.

AF SYSTEM : Agri-silvi,alley-crop
LOCATION : Nigeria, I.I.T.A.
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Mulch
TREE SERVICE :
CROPS : Maize
ANIMALS :
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : yes
COST DATA : no
BENEFIT DATA : no
REFERENCE NUMBER : 0034

Amongst others, an analysis of a zero-tillage leucaena-maize alley cropping experiment as conducted at I.I.T.A.,Nigeria is presented. It provides labour data, but no discounted cost benefit analysis.

AUTHOR,TITLE : Voss,R.(1981).Agroforestry and forest plantations-An integrated approach to land use. In "Tropical forests, source of energy through optimization and diversification".U.P.M. Malaysia.

AF SYSTEM : Agri-silvi
LOCATION :
TREE SPECIES : Eucalyptus spp,Gmelina arborea,Albizzia falcataria
TREE PRODUCTS : Construction wood,pulp
TREE SERVICE :
CROPS : Cocoa
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : no
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0075

The economics of pure plantation forestry are compared with an agroforestry approach to land use. Based on hypothetical models the author concludes that the agroforestry approach would yield a higher net cumulative cash flow.

AUTHOR,TITLE : Wake,N.L.(1978). A promising smallholder crop with export potential for Coastal Kenya.(Unpublished)

AF SYSTEM : Silvi-past,protein bank
LOCATION : Kenya, Coastel area
TREE SPECIES : Leucaena leucocephala
TREE PRODUCTS : Fodder,woodfuel
TREE SERVICE :
CROPS :
ANIMALS :
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0053

A pre-feasibility study of a project to produce leucaena leaf meal by small holders in the coastal area of Kenya is described. Cost and benefit data are based on Malawi findings and adjusted for Kenya circumstances.

AUTHOR,TITLE : Wan Mohamed,W.E.(1982). Animal production in rubber plantations - a review, Rubber Research Institute of Malaysia.

AF SYSTEM : Agri-silvi-past
LOCATION : Malaysia
TREE SPECIES : Hevea spp
TREE PRODUCTS :
TREE SERVICE : Micro climatic
CROPS : Maize,soya bean, pigeon pea
ANIMALS : Poultry,sheep,goats
METHODOLOGY : no
LABOUR DATA : yes
YIELD DATA : no
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0063

Integrating animals with plantation crops has been shown to bring direct and indirect benefits to the small holders or estate owners. The direct income is through selling of livestock and indirect income is obtained from saving on weeding costs and fertilizer costs. Development towards integrated farming will result in a modest sum of saving in foreign exchange for Malaysia through reduction in the importation of meat and animal feed.

AUTHOR,TITLE : Wan Mohamed,Wan Embong and Chee Yan Kuan.(1976). Maximising returns in immature rubber smallholdings. In "Proceedings of the RRIM Planters Conference",Kuala Lumpur, Malaysia.

AF SYSTEM : Agri-silvi-past
LOCATION : Malaysia
TREE SPECIES : Hevea spp
TREE PRODUCTS : Latex
TREE SERVICE :
CROPS : Maize, soyabean,peanut,banana
ANIMALS : Chickens
METHODOLOGY : no
LABOUR DATA : no
YIELD DATA : yes
COST DATA : yes
BENEFIT DATA : yes
REFERENCE NUMBER : 0045

Annual crops, such as groundnut, soyabean and maize, can be intercropped with rubber during the first two years. Bananas may also be used. After about two years of growth the leaves of the rubber trees normally shade the interrows and intercropping becomes uneconomical. Livestock (poultry) may be introduced at this stage. Cost of production, yield and benefits are given for each of these complementary activities.