4 Green Village Program

(1) General

In Tocantins State, the agriculture and livestock activities are mostly being carried out in areas originally occupied by Cerrado (Brazilian Savanna) or forests, and commonly these activities started at the margin of river beds where the soils present relatively better natural fertility, characterizing a disordered exploitation process, with a nomad character as far as the soil looses its production capacity. Along the time, directly - by the constant devastation or inadequate use of fire - or indirectly - exposition of soil, erosion, accumulation of sand in the aquifers - the environment has suffered and is still suffering constant transformations.

Bearing in mind the region characteristics as for soil, vegetation and climate, followed by the agriculture and livestock activities implementation model, nowadays mostly of the productive areas are in a weakening process, substantially reducing their productive capacity, creating a stronger pressure over the original vegetation.

Therefore, this program is fully justifiable once it aims at the recovery of soil productive conditions and at improving the social conditions of rural communities through preservation, restoration and rationalization of natural resources.

Within this context, the Program aims at approaching several alternative aspects oriented to the producer and rural communities, offering possibilities of a development in harmony with the environment.

In order not to discriminate production, social and environmental aspects, the implementation of the following sub-projects were planned.

The sub-programs activities are presented as follows;

(GREEN VILLAGE)	Activities
Improvement of Rural Environment	• Introduction of a Sustainable Agriculture Model for Mini and Small Scale Farmers in the Bico do Papagaio Region • Introduction of an Integrated Sustainable Agriculture Model of Buffaloes raising and Fruit cultivation in the Jalapão Region • Introduction of Sustainable Agriculture of Mini and Small Scale Farmers
Sustainable Farming Model	• Introduction of Pilot Farm of the Horticulture and Livestock Integrated System • Introduction of Pilot Farm of the Grains Production and Beef raising Integrated System • Introduction of Fruit cultivation
Distribution of Seeds and Seedlings	• Support to Research • Support to the Production of Seeds, Seedlings and Semen • Support to the Production of Matrix of Small Animals • Support to the Commercialization of Seeds, Seedlings and Semen
Demonstration Program	• Demonstration

These sub-programs will be implemented through a credit line to be offer to producers interested in the improvement of life quality together with environmental preservation, and with the infrastructure implementation to be administered by Public Organisms.

(2) Objective of the Green Village Program

1) General Objectives

The general objective of the Green Village Program is to stimulate the environmental preservation activities, through the introduction of sustainable agriculture, in order to raise the rural producer socio-economic level, respecting the environment, in consonance with the regional legislation in force, contributing to the preservation / restoration / rationalization of natural resources utilization.

Through this Program, the following benefits are planned to be attained:

1. preservation of natural resources, at long term, through the introduction of sustainable agriculture
2. to search for a sustainable development in the agriculture and livestock activities areas
3. to reduce the uncontrolled fires
4. to improve the social infrastructure conditions in rural communities (education, health, transportation, leisure, etc.)
5. to propitiate the permanence of the Men in the field, in a productive way
6. to help the attainment of consciousness about the importance of natural resources, from the social point of view as well as the productive one
7. to strengthen the associations and their organization
8. to administratively qualify the rural producers
9. to render available alternatives for the obtainment of financing lines
10. to facilitate the access to technical assistance and production technology
11. to increase the production and productivity of the agriculture and livestock sector
12. to offer production systems alternatives
13. to stimulate the diversification of activities
14. to reduce the pressure over natural areas and to recuperate degraded areas
15. to increase the vegetal coverage area

The Green Village Program is an incentive program to the sustainable agriculture. Through the implementation of pilot farms, the future image of the State agricultural development will be reflected, creating an ideal example of agriculture and livestock production.

With the implementation of the Green Village Program it is intended to put down at once all the present restrains related to the agricultural activity of the small rural producers, specially the problems concerning to the burning practice and social

condition, extreme poverty, caused by the financing system in force, which hinders the agricultural activities development, and by the environmental degradation caused by deforestation, fires and inadequate management of pastures.

Small farmers are supposed to face many difficulties, if acting alone, in combating these restrains, utilizing the present financing systems, once they are expensive even for the medium and large scale producers.

The Pilot Farm in the Program aims, besides the technological diffusion, at the extension of the state agricultural policy to all the farmers. The Program shall be executed based on a condition of absolute guarantee by the state government, escaping from the dependency of the financing system. The conception of this Pilot Farm will be similar to the conception of the State Integrated Development Program, avoiding the repetition of the results of other Brazilian states agricultural development programs, i.e., the environmental degradation.

2) Public Support

The state government shall also guarantee, with a due planning and programming, the commercialization of commodities produced in the State, such as soybean and corn, bovine and swine meat, offering basic conditions for the participation of the private sector.

Therefore, in the execution of these programs, the State Government shall support the farmers in the following ways:

- These programs have many new technologies in which the farmers have no experience. Therefore, all the State agencies, namely, RURALTINS, SAG, related research institutes such as EMBRAPA, UNITINS, private organizations, NGOs, CAMPO, which is administrating PRODECER III in Pedro Afonso, shall give support to the farmers.
- The programs have a public role, as above mentioned, being a kind of public works in a way although the participation of farmers and associations will be carried out through private loans.

Therefore, the State Government shall bear the responsibility of installing social infrastructure (roads, electricity, water supply, etc.). The land acquisition cost will be borne by the farmers themselves. The land consolidation cost, irrigation facilities cost, building cost (housing, farm machinery shed, warehouse for farming materials, barns for livestock, etc.), and farm machinery cost should be borne by the State Government at first, and shall be repaid by the farmers after the stabilization of their livelihood in the long term, at low interest rates and under some redeemable terms, e.g. for three years in cereals farming and livestock raising, and five years in orange growing, etc.

3) Concepts of Sustainable Agriculture

The development concept of the sustainable farming is as follows.

1. To recuperate environmentally degraded areas in the State, through reforestation, preserving them afterwards
2. To control the soil erosive process with the introduction of an adequate management and crop rotation of grains and pasture plants. The crop rotation will propitiate the supply of organic matter deriving from pasture remaining roots to the grains crops, and the soil pH will be periodically corrected and provided soil with nutritive macro and micro elements during cereals cultivation to the pasture plants. The joint utilization of crop rotation and manuring utilizing animal excreta will increase the soil fertility, water retention capacity, improving the soil structure, resulting in an agricultural production without a considerable application of chemical fertilizer and pesticides.
3. To preserve the environment, as much as possible, with a proper management of the livestock activity. The introduction of improved animal races will contribute to the increase of productivity, considerably reducing the effects of this activity in the environment.

Therefore, the Green Village Program aims at the control of environmental degradation through the introduction of sustainable agriculture, the efficient livestock raising, introducing improved races and advanced raising methods and with scrupulous management. This expression "sustainable agricultural and livestock raising" means the possibility to sustain this activity for, at least, the next 100 (hundred) years, what would be possible for only 15 (fifteen) to 20 (twenty) years utilizing the present extensive farming system.

However, reckoning on the presently available technological level, it will be impossible to attain this objective. For instance, in the case of pastures, they are frequently considered excellent for the control of soil erosion. Nevertheless, the pasture plants being largely utilized in the Brazilian tropic, such as "Guiné Grass" or "Brachiary", are not of the stolonipherous type variety thus being inefficient against the soil erosion process. Therefore, it is fundamental to research new pasture plant varieties, with good nutritive contents, stolonipherous type, good reproduction capacity, tasty for the animals and good as vegetal coverage. Furthermore, there is still the need of a study about animal raising methods in pastures irrigated by a center pivot. Therefore, it is verified that there is a huge deficit of necessary studies or researches to carry out an efficient agricultural and livestock development in the State.

2) Specific Objectives of the Sub-programs

The specific objectives of each sub-program are as follows;

(GREEN VILLAGE)	Specific Objectives
Improvement of Rural Environment	• To offer credit lines to Rural Producers, specially in wanting areas and for Mini Producers, for fixed investment which can contribute with the environment improvement • To strengthen the small producers • To promote livestock and agriculture associated activities to

	introduce a sustainable agriculture with the utilization of organic matter • Through the introduction of sustainable agriculture, reduction the environment deterioration in terms of soil conservation, control of fires, etc. • To improve the life conditions of rural producers • To introduce an intensive agriculture system which absorbs the surplus of labor force in the countryside
Sustainable Farming Model	• To offer credit lines to the sustainable agriculture introduction activities • To strengthen the small, medium and large scale production sectors • To introduce the sustainable agriculture • To reduce the soils degradation through a sustainable agriculture • To stimulate the production of cereals in large and medium scales
Distribution of Seeds and Seedlings	• To offer credit lines to producers and rural associations, those who contribute with the improvement of seeds quality and seedling distribution system. • To supply seeds and seedlings to the producers • To increase the quantity of green areas • To promote research activities • To stimulate silviculture and agro-forestry activities • To improve the commercialization system of seeds and seedlings to offer them in favorable conditions to the final producers • To improve the life conditions of small producers
Demonstration Program	• To implement a Demonstrative Field in order to demonstrate to Rural Producers Methods of Sustainable Agriculture • To improve research activities in sustainable agriculture areas • To diffuse technologies developed in the field • To qualify the extension staff in the sustainable agriculture areas

(3) Required Amount

The amount required for the implementation of this program is estimated as follows;

Sub-Program	Required Amount (R$)
Improvement of Rural Environment	30, 000, 000
Sustainable Farming Model	60, 000, 000
Distribution of Seeds and Seedlings	10, 000, 000
Demonstration Program	4, 000, 000
TOTAL	104,000,000

4.1 Improvement of Rural Environment

(1) Contents of the Project

The present program aims at the preservation of Cerrado environment, defining agricultural development models in harmony with the characteristics of each region. Basically, this program comprehends the increase of green areas with the participation of the region inhabitants. It is composed of the following items:

1. Introduction of Mini and Small Scale Sustainable Agriculture in the Bico do Papagaio Region.
2. Introduction of Integrated System of Buffaloes Breeding and Fruit Cultivation in the Jalapão Region.

(2) Objective

The General Objective is to promote the increment and diversification of activities developed by farmers who utilize familiar labor force, making feasible access conditions to credit, application of proper technology and, consequently, improvement of socio-economic conditions of the local, regional and even state community.

The Specific Objectives of each action are as follows;

1) Introduction of Sustainable Agriculture by Mini and Small Scale Farmers in the Bico do Papagaio Region

The program specific objectives are as follows;

1. to allow the acquisition of machines and equipment to be utilized in the activities;
2. to stimulate the implementation of alternative crops production activities, economically feasible and ecologically adequate;
3. to promote the execution of sustainable and associated production systems;
4. to improve the population life standards;
5. to contribute for the fixation of Man in the countryside.

2) Introduction of Integrated Sustainable Agriculture of Buffaloes raising and Fruit cultivation in the Jalapão Region

This model objectives will be attained through the introduction of production integrated systems, associating the livestock and fruit cultivation activities, in order to raise the financial and social returns of the farm.

1. to facilitate the acquisition of agricultural machinery and equipment;
2. to implement the fruit cultivation in order to improve the farm profitability;
3. to increase the labor force demand, besides the familiar one;
4. to improve the community socio-economic conditions; and
5. to reduce the pressure over primary natural areas, caused by the expansion of extensive cattle raising.

(3) Justification, Background, Necessity of the Project

1) Introduction of Sustainable Agriculture by Mini and Small Scale Farmers in the Bico do Papagaio Region

Many landless farmers, petty and small farmers inhabit the Bico do Papagaio region, the northernmost region of the Tocantins State. They make their living through subsistence

farming in burnt field due to the lack of or insufficient funds. Their poverty is one of the greatest social problems. It is very difficult to solve these problems under the present financing conditions.

Furthermore, the region has various environmental problems, such as burnt field, soil degradation and erosion caused by reckless field management.

It is necessary to solve these problems simultaneously. This program is one of the means of solving these problems and will also contribute for the improvement of the urban environment by making green belts of vegetable and cereals in the suburbs.

On the other hand, a local variety of swine is being produced in Tocantins State, although it has low quality and low breeding efficiency. This program introduces an improved swine, which has high quality, high breeding efficiency and possibility of exportation after stamping out the Foot and Mouth disease risk.

2) Introduction of Integrated Sustainable Agriculture of Buffaloes breeding and Fruit cultivation in the Jalapão Region

Many small farmers having less than 320 ha inhabit in the Jalapão Region. They make their living through subsistence farming in burnt fields because of the lack of or insufficient funds. Their poverty is one of the greatest social problems. It is very difficult to solve these problems under the present financing conditions. The fruit trees can grow in unsuitable land for cereals and vegetables. The promotion of fruit growing shall contribute to the elevation of farmers income.

The Jalapão region due to its geographical location presents a high transportation cost. In order to overcome this restrain, it is important to produce typical fruits of the region, assuring a consumption market.

On the other hand, the Jalapão region is suitable for buffalo raising because of the existence of scattered lakes and swamps. Buffalo products have high commercial potential in Brazil. In special, buffalo cheese and buffalo low cholesterol meat have an increasing demand by the consumers in big cities of the southern Brazilian states. Buffalo has higher fertility rate, useful life term and increase rate of body weight than the local beef cattle.

(4) Details of the Project

1) Introduction of Sustainable Agriculture by Mini and Small Scale Farmers in the Bico do Papagaio Region

The pilot farm will be organized in each suburb (zone) of three towns in the Bico do Papagaio Region. The implantation plan of this pilot farm is as follows;

1. The association of each zone is organized with ten farmers, who own an average of 18 ha of

cultivated land, ranging from 5 ha to 30 ha (from 10 ha to 60 ha including the environmental preservation area).

2. The association manages the use and the maintenance of farm machinery and irrigation facilities, supply of piglets and formula feed, and selling of cereals and swine.
3. Each farmer selects the kind of vegetables in each season, considering market prices, and cultivates in two ha of field, which has irrigation facilities, such as drip irrigation facilities, furrow irrigation facilities, etc., and can cultivate vegetables even in the dry season. Vegetable is selected from tomatoes, sweet melon, onion, potatoes, carrot, etc., which are consumed in large amount in Tocantins.
4. In 16 ha each farmer cultivates maize for feed in wet season, and millet as cover crop in dry season to prevent soil erosion and to supply organic matter. The remaining 2 ha will be cultivated with vegetables during one year (2 harvests) and with maize during 7 years (7 harvests), that is, there will be crop rotation with vegetables and maize.
5. The total maize cultivation area of 10 farmers in the association is 160 ha, and the farm works of maize cultivation will be carried out with farm machinery managed by the association.
6. The produced maize is used every year giving priority for feeding 80 heads of swine (each farmers), the remaining being sold. The amount of maize per head for fattening is about 250 kg/year, therefore, the total amount of maize for fattening for the 80 heads will be about 20 tons. If the yield of maize is 3 tons/ha, the produced amount of maize by each farmer in 16 ha shall be 48 tons, out of which 28 tons can be sold.
7. The produced maize is sent to the feed mixture factory, which is managed by the association. The feed mixture factory of the association produces formula feed for swine and distributes it to the association members (10 farmers).
8. Swine is produced under a contract between the association and the 10 farmers. The association produces piglets by triple cross within improved varieties, such as Large Yorkshire, Landrace, Duroc, etc., in the own breeding farm, and supplies piglets to 10 farmers after weaning (2 months from birth). The farmers carry out the fattening of 27 piglets for 4 months at one time, thus 80 heads in three times a year.
9. The association breeding farm has about 50 heads of adult female swine and 2 heads of adult male swine, and the produced maize of about 52 tons is used by these breeding swine.

Required Funds

The required funds for one association is shown in the following table;

	Items	Quantity
1)	Land consolidation	180 ha
2)	Irrigation facilities (water storage tank, pump, piping, drip irrigation set)	10 units
3)	Farm machinery	
	Tractor 128 HP, 4WD	1 unit
	Tractor 85 HP, 2WD	1 unit
	Combine, with attachment for corn harvest	1 unit
	Straw chopper	1 unit
	Planter (for corn, with fertilizing m.)	1 unit
	Disk harrow 20" x 24	1 unit
	Pack roller	1 unit
	Broadcaster	1 unit
	Injector or vacuum car (for liquid manure of swine)	1 unit

	Power sprayer - tank 400 liters	1 unit
	Truck - 5 tons (for transportation of feed, swine)	2 units
4)	Building & facilities	
	Warehouse (40 m2)	10 units
	Swine breeding barn (400 m2)	1 unit
	Swine fattening barn (100 m2)	10 units
	Farm machinery shed (400 m2)	1 unit
	Workshop for machinery (60 m2)	1 unit
	Compost shed (25 m2)	10 units
	Simple feed mixture factory (150 m2, with grinder, mixer, etc.)	1 unit
	Silo for maize (300 ton)	1 unit
	Simple butchery (200 m2)	1 unit
5)	Initial running costs	
	Vegetable growing/ha	20 ha
	Maize cultivation/ha	160 ha
	Purchase of breeding swine	52 heads
	Feeding of swine	
	Medicine for swine	
6)	TOTAL	R$ 1, 026, 700

2) Introduction of Integrated Sustainable Agriculture of Buffaloes raising and Fruit cultivation in the Jalapão Region

The pilot farm will be organized in the suburb area of São Félix do Tocantins, an easily accessible place to local main roads. The implantation plan is as follows;

a. Fruits production

1. The association will be organized with five farmers, who own an average of 30 ha of cultivated land (60 ha including the environmental preservation area).
2. The association manages the use and maintenance of farm machinery and irrigation facilities, and the selling of fruits, buffalo meat and its cheese.
3. Each farmer grows fruit trees, such as Buriti, Pequi, Gariroba (Palmito) and other fruits in 20 ha out of 30 ha of cultivated land. The orchard is equipped with irrigation facilities and is irrigated in dry season. The bottom grass is cultivated in the orchard to prevent soil erosion and cut periodically. In the remaining 10 ha of each farmer cultivated land, elephant grass and sugar cane are cultivated for the feed of buffalo.
4. In the orchard of each farmer, farm roads are constructed to carry in the farm materials, to allow the control of pests and diseases by the utilization of machines, to allow the grass cut by machine, to carry on fruits, etc.
5. Each farmers has a workshop to grade fruits, to pack them in cases and to storage temporarily, farm machinery shed and farm materials shed. The farm machinery is used in a joint operation in the association, as much as possible.

b. Buffalo production

The registered buffaloes are introduced from São Paulo State or Bahia State

Each farmer raises buffaloes in the swamp near his own orchard, 20 heads of adult female buffaloes and one adult male buffalo. The produced female buffaloes are used to produce milk and cheese, and the produced male buffaloes are used to produce buffalo meat. It is recommended that the association produces smoked cheese besides the common type of cheese, and devises the packing to characterize the local production.

The activity will be carried out in an extensive way over the vegetal coverage of the fruit cultivation area and, specially for milking buffaloes, a nutritional supplement composed of sugar cane and/or elephant grass cultivated in the farm will be supplemented.

Required Funds

The required funds for one association is shown in the following table:

	Items	Quantity
1)	Land consolidation	150 ha
2)	Irrigation facilities (water storage tank, pump, piping, drip irrigation set)	100 ha
3)	Farm machinery	
	Tractor 35 HP, 4WD	2 units
	Disk harrow (for 35 HP tractor)	2 units
	Mower (for cutting bottom grass)	2 units
	Self propelled power sprayer - tank 400 liters	2 units
	Truck - 5 tons (for transportation of feed, swine)	1 unit
	Truck - 2 tons	5 units
4)	Building & facilities	
	Warehouse (100 m^2)	5 units
	Farm machinery shed (100 m^2)	1 unit
	Workshop (200 m^2)	5 units
	Simple cheese factory (100 m^2)	1 unit
	Buffalo milk parlor (100 m^2)	1 unit
5)	Initial running costs	
	Fruits growing/ha	100 ha
	Forage crop cultivation/ha	50 ha
	Purchase of buffalos/head	105 heads
	Medicine for swine	
6)	TOTAL	R$ 373, 100

(5) Project Implementation Methodology (Strategies, Implementation Method, etc.)

Based on the basic concept of the Green Village Program, it is possible to plan an agricultural and livestock development suitable to any condition, introducing technologies adapted to natural and farmers conditions, making possible a low cost agricultural production. That is, through the Pilot Programs it will be possible to elaborate several Alternative Programs.

Concerning the financing, the Alternative Programs shall fulfill the following basic conditions:

1) Terms and subjects of financing for the Project of Introduction of Sustainable Agriculture by Mini and Small Scale Farmers in the Bico do Papagaio Region

Terms of financing;

1. Organization of association for common use of farm machinery, agricultural facilities, swine shed and commercialization of products;
2. Introduction of rotation between vegetables and forage crops and countermeasures against soil erosion; and
3. Introduction of European and American breeding swine.

Subjects of financing;

1. Land reclamation and soil preparation.
2. Farm machinery and facilities for common use.
3. Irrigation facilities (any type).
4. Facilities for swine raising.
5. Acquisition of European and American breeding stock.
6. Agricultural inputs in the first years.

2) Terms and subjects of financing for the Project of Introduction of Integrated Sustainable Agriculture of Buffaloes raising and Fruit cultivation in the Jalapão Region

Terms of financing;

1. Organization of association for common use of farm machinery, facilities, and commercialization of products;
2. Introduction of countermeasures against soil erosion in orchard; and
3. Introduction of buffaloes raising.

Subjects of financing;

1. Land reclamation and soil preparation.
2. Acquisition of fruit trees seedlings.
3. Countermeasures against soil erosion (vegetal coverage).
4. Farm machinery and facilities for common use.
5. Irrigation facilities (any type).
6. Workshop to grade fruits, to pack them into cases and tempory storage, farm machinery shed and farm materials shed.
7. Acquisition of buffaloes reproducers.
8. Simple cheese factory for buffaloes milk processing and milking parlor.
9. Agricultural inputs in the first 2 years.

3) Introduction of Sustainable Agriculture for Mini and Small Farmers

Besides of the two sub-programs above mentioned, it is necessary to introduce the sustainable agriculture for mini and small farmers in other organisations under feasible access conditions to credit.
This Sub-program aims at the integrated production of vegetables and small animals.

Terms of Financing;

The project shall be executed according to the following technical requirements;

1. The irrigated areas can be utilized for crops aiming at the supply of feeds to the animals as far as it doesn't constrain the project execution and results.
2. The non irrigated areas shall be utilized for subsistence crops as well as crops to be consumed by the animals (rice, maize, sorghum, sugar cane, feijão beans).
3. In all areas a crop rotation system shall be applied, aiming at a better residues utilization and control of pests and diseases.
4. Due care shall be taken as for soil, water and vegetal coverage conservation.

Subjects of Financing;

1. Acquisition/installation of irrigation system up to 5 ha, in which fruits, legumes, vegetables and cereals can be cultivated.
2. Implementation of green houses which allow the production of vegetables during the rainy season.
3. Acquisition of machinery and attachments (*).
4. Acquisition of breeding stock and respective infrastructure for the production of small animals (swine, poultry, goats, sheep, bees).
5. Acquisition of agricultural inputs (lime, fertilizers, seeds, seedlings, livestock feeds) until the first harvest.

(*) - Preference will be given to acquisition of common use goods in order to strengthen the rural organizations.

To apply for financial resources some measures shall be taken;

1. The project shall be analyzed in a global way within the productive unit.
2. The available resource for each applicant is limited to R$ 20,000.00, according to this repayment capacity, equivalent to 70% of the estimated gross income.
3. The access to credit will be through a technical project elaborated by duly authorized institution, which will submit it to the CMDR (Municipal Council of Rural Development) and to the financing agent.
4. The credit application follow up will be carried out through inspection visits to be carried out during the project execution.
5. The repayment will be established according to the agreement, the grace period depending on the start of production/commercialization, the repayment term being up to 15 years.

4.2 Distribution of Seeds and Seedlings

(1) Contents of the Project

The Sub-program of seeds and seedlings distribution aims at improving the distribution conditions to the producers who want to improve their agricultural activities. This sub-program will be implemented through credit lines related to fixed and semi-fixed investments. Through this sub-program, the following activities will be strengthen:

1. Support to research activities of the producers associations.
2. Production of seeds (soybean, rice, feijão beans, pasture plants).
3. Production of seedlings (fruit trees, trees, etc.).
4. Production of breeding stock of small animals.
5. Commercialization of seeds, seedlings and semen.

(2) Objective

The objective of the green village program aims at the control of environmental degradation through the sustainable farming composed of the crop rotation between cereals and pasture plants and the efficient live stock raising. To obtain the objective, supply of seeds, seedlings and breeding stocks to farmers is a matter of great importance.

The objective of this sub-program is to offer favorable conditions of seeds and seedlings production and commercialization, to producers and traders, specially concerning to the cost. This sub-program comprehends the following components:

1. Support to research on production of seeds and seedlings.
2. Support to the production of qualified seeds (soybean, rice, feijão beans, pasture plant seeds).
3. Support to seedling production.
4. Support to the production of breeding stock matrix of small animals.
5. Support to commercialization systems for the distribution of seeds, seedlings and semen.

The specific objectives of each action are as follows;

Actions	Specific Objectives
1. Support to researches on seeds and seedlings production	• To improve the quality in the production of seeds, utilizing the voluntary research actions of the producers • To offer necessary conditions to producers so that they can develop their own researches
2. Support to the production of qualified seeds (soybean, rice, feijão beans, pasture plant seeds)	• To offer necessary conditions for the increase of seeds production areas - infrastructure (field, machinery, silage, etc.) • To improve the pasture quality
3. Support to the production of seedlings	• To offer necessary conditions for the production of fruit trees and trees seedlings, aiming at the incentive to fruit cultivation and the increase of job opportunities

		• To stimulate the reforestation and increase of green areas
4	Support to the production of small animals breeding stock	• To offer necessary conditions for the production of small animals. • To improve the life conditions of rural producers
5.	Support to commercialization systems of seeds, seedlings and semen distribution	• To lower down the prices of seeds and seedlings, through the improvement of the commercialization system • To obtain better quality seeds and seedlings

(3) Justification, Background, Needs of the Project

At present, acquiring good quality agricultural inputs, specially seeds and seedlings, with accessible prices is a very important requisite to obtain profits in the agricultural activities. In Tocantins State, it is difficult to obtain agricultural inputs due to the lack of development in their production. In the case of several agricultural inputs, the State depends on the production of other states, raising the transportation costs as well as the prices. Furthermore, sometimes these inputs are inadequate to the State conditions. Because of that, the Tocantins State agriculture sector is still in the subsistence stage. There is a great need to promote the quality improvement of agricultural inputs, specially seeds and seedlings, besides the breeding stock for small animals, in order to improve the agricultural and livestock activities in the State. This can be attained through the improvement of research, production and commercialization systems.

In this sense, this sub-program was formulated to offer support to research, production and commercialization. The justifications of each action are as follows;

1) Support to Researches on Seeds and Seedlings Production

In Tocantins State, the seeds production activity requires more research to fulfill the needs of the agricultural sector production. One of the biggest problems hindering the increase of production is the lack of varieties adapted to the climatic and soil conditions of the State. It is necessary to give complete support to research in order to keep the system with growing genetic options. The support to researches carried out by the farmers themselves can also produce good benefits, innovating the basic technology and creating the possibility to diffuse the technologies developed by the farmers to other neighboring farmers.

2) Support to the production of qualified seeds

At present, the seed producers are suffering from various problems, although the Tocantins State has favorable conditions to produce its own seeds, once diseases found in other states are not present yet. For the increase of grains production, it is necessary to increase the supply of adequate seeds to the soil and climatic conditions. Through the incentive to seeds producers, the final producers could obtain qualified seeds in a reasonable price.

3) Support to the production of seedlings

Although the Tocantins State has great possibilities to develop silviculture activities, its forestry production is still insignificant. In order to increase the forest areas, it is necessary to strengthen the production activities of seedlings which could be offered at low prices. Within the State, there are not yet reasonable establishments to promote the reforestation activity. At present, the actions depend on the work of volunteers and non profitable institutions. There is the urgent need to strengthen proper seedling production establishments in the State.

4) Support to the production of small animals breeding stock

The agriculture developed in Tocantins State is predominantly carried out in a familiar basis or subsistence basis, utilizing the slash and burn system in small areas and being carried out by small farmers. The poverty among the landless workers and small producers is becoming a serious social problem, therefore the Federal and State governments are trying to improve their life and income conditions through loans.

The small familiar agriculture in Tocantins includes extremely diverse situations, concerning to the type of activity, exploited areas, and utilized techniques. It can be found, for instance, small farmers exploiting 5 to 10 ha with specialization and utilization of irrigation techniques in vegetable production as well as cattle raising activities in areas between 100 to 200 ha, however in the majority of the cases the small agriculture is oriented to self-subsistence.

The livestock activity in Tocantins, concerning to productive management and employment of techniques which aim at genetically improving the herds, such as artificial insemination, controlled breeding, introduction of improving bulls and transference of embryos, is not yet well developed.

On the other hand, in order to promote the sustainable agriculture, specially by the small producers, it is fundamental to utilize organic manure in small animal raising. Through the utilization of organic matter, the agriculture in Tocantins State can become sustainable.

5) Support to commercialization systems of seeds, seedlings and semen distribution

Concerning to the production of seeds, seedlings and semen, the producer shall be organized in associations and/or foundations to strengthen the importance of utilization of a better quality genetic material and also to create a support structure for the commercialization and distribution of the products. The State can contribute for the organization, creation and strengthening of these institutions in order to proportionate to the producer a solid and functional structure.

On the other hand, the State shall stimulate the production of basic, certified and inspected seeds in order to assure production gains through a better quality genetic material. These incentives can be given through the exemption of ICMS or through the possibility for the producer to use the ICMS in his commercial transactions.

Another manner is the creation of a quality seal under the control of the Secretariat of Agriculture, for that the producer can develop all the production process within the required standards. This seal would create a differential of the product in the market within the required standards. It would be an important measure once there are products (grains) such as seeds in the market competing unfairly with the authorized producer. Through these actions and once there are enough seeds to serve the market, the State can negotiate with the financing institutions to give preference to those producers who utilize seeds with the quality seal, thus strengthening the productive sector.

This action is conditioned to the improvement of the commercialization system of qualified seeds and seedlings.

(4) Project Details

These actions will be implemented through favorable credit lines, which would motivate the production increase.

The details of each action are as follows;

1) Support to the researches on Seeds and Seedling Production

This action is oriented to those producers who intend to improve the seed production quality in an experimental way. The eligibility for this item will be analyzed by SAG or RURALTINS, through the presentation of seeds and seedlings research plans. Considering the high risk of these actions, better credit conditions shall be applied, aiming at the development of research by the producers. To differentiate this type of credit from the existing ones, the annual O & M costs can also be considered as fixed investment, with enough grace and repayment terms. The financing eligible items are the fixed, semi-fixed investment and annual O & M costs for a grace period of 3 years and 10 years of repayment term, for the following research fields:

1. Introduction of new varieties of seeds for the State
2. Introduction of new specimen of seedlings for the State
3. Introduction of new cultivation technologies for the State

The items to be financially eligible are the following:

Fixed Investment:

- Land reclamation (deforestation, leveling, fences, etc.)
- Soil ammendment in the first 3 years

- Construction of warehouses and silos
- Installation of irrigation systems
- O & M costs which are considered as research activities
- Cost of researchers and workers in the first 3 years
- Procurement of necessary equipment for research
- Procurement of machinery

2) Production of seeds (soybean, rice, feijão beans, pasture)

In this item, the fixed and semi-fixed investment activities which aims to promote the production of soybean, rice, feijão beans and pasture plant seeds will be financed. The eligible items for financing are as follows:

Fixed Investment:
- Land reclamation (deforestation, leveling, fences, etc.)
- Soils ammendment in the first 2 years
- Construction of warehouses and silos
- Installation of irrigation systems

Semi-fixed investment:
- Procurement of Equipment
- Procurement of Machinery

3) Production of seedlings (fruit trees, trees, etc.)

In this item, the fixed and semi-fixed investment activities which aims at the promotion of fruit trees and trees seedlings production will be financed. The eligible items for financing are as follows:

Fixed Investment:
- Establishment of nurseries
- Construction of facilities (irrigation systems, buildings, etc.)

Semi-fixed investment:
- Procurement of Equipment
- Procurement of Machinery
- Procurement of seedlings and seeds in the first year
- Production inputs in the first year

4) Production of small animals breeding stock

In this item, the fixed and semi-fixed investment activities, which aims to promote the production of for small animals will be financed. The eligible items for financing are as follows:

Fixed Investment:

- Facilities for small animals raising

Semi-fixed investment:

- Procurement of Equipment
- Procurement of Machinery

5) Commercialization of seeds, semen and seedlings

In this item, the fixed and semi-fixed investment activities which aims at the promotion of improvement of seeds, seedlings and semen commercialization will be financed. The eligible items for financing are as follows:

Fixed Investment:

- Facilities for commercialization (silos, warehouses, etc.)
- Improvement of the Commercialization System (communication system, transports, etc.)

Semi-fixed investment:

- Procurement of Equipment
- Procurement of Machinery and locomotives

(5) Project Implementation Methodology (Strategies, Implantation Methods, etc.)

Each of the actions will be implemented through the following methodologies;

1) Support to the researches on Seeds and Seedlings Production

Due to difficulties in evaluating eligible research activities, these evaluations will be carried out by groups of researches from SAG, RURALTINS, UNITINS and other agricultural research institutions. This action financing will be implemented only before the presentation of authorization documents supplied by these groups. The interested parties shall present their research plans to the Group for evaluation. The beneficiaries are individual producers or association members who intend to continue the development of agricultural activities.

2) Production of seeds (soybean, rice, feijão beans, pasture plants)

This action financing will be applied before the evaluation of the Seeds Quality Control Department, with the support of RURALTINS and SAG.

3) Production of seedlings (fruit trees, trees, etc.)

The seedlings production financing will be applied for any enterprise, which aims to produce seedlings, before the evaluation of the projects, by the financing agent.

4) Production of small animals breeding stock

The seedlings production financing will be applied for any enterprise that aims to produce small animals breeding stock, before the evaluation of the projects by the financing agent.

5) Commercialization of seeds, semen and seedlings

This action financing will be applied to the traders, before the evaluation of the Seeds Quality Control Department, with the support of RURALTINS and SAG.

4.3 Sustainable Farming Model

(1) Project Contents

The proposed models of sustainable farming in the Tocantins State, considering environmental preservation are the following four models:

1) Farming Integrated Vegetables and Swine Production by Small Farmers in Suburbs.
2) Farming Integrated Cereals and Beef Cattle Production by Small Farmers
3) Farming Integrated Cereals and Beef Cattle Production by Middle and Large Scale Farmers
4) Fruits Production in Tocantins State

Required amount for the implementation of this sub-programa are shown in following table.

Sub-Program	Required Capital
• Integrated Vegetables and Swine Production Farming by Mini and Small Farmers in Suburbs	R$ 3, 750, 950
• Integrated Cereals and Beef Cattle Production Farming by Small Farmers	R$ 9, 918, 000
• Integrated Cereals and Beef Cattle Production Farming by Middle and Large Scale Farmers	R$ 3, 256, 000
• Fruits Production in Tocantins State	R$ 1, 227, 500

(2) Objectives

1) Integrated Vegetables and Swine Production Farming by Mini and Small Farmers in Suburbs

The program contents are as follows;

i. The pilot farm is organized in the suburbs of Araguaína, Palmas and Gurupí.
ii. The pilot farm is managed by the association in various aspects, such as farm machinery common use, maintenance and repair of farm machinery and equipment, supply of piglets, supply of formula feed, slaughter of swine, silo of maize for feed, and selling of cereals and swine.
iii. The association is organized with about ten petty and small farmers in order to develop activities such as vegetable growing, maize cultivation for feed, and swine raising.
iv. The objective of the pilot farm is to verify sustainability of crop rotation farming and its profitability, as well as the extension of sustainable agriculture, farm design and efficient farm management and the planing of environmental protection areas for the agricultural development in a regional basis.

2) Integrated Cereals and Beef Cattle Production Farming by Small Farmers

The program contents are as follows;

i. The pilot farm is organized in the northern region, the central southern region and southeastern region, respectively.
ii. The pilot farm is managed by the association in various aspects, such as farm machinery common use, maintenance and repair of farm machinery and equipment, and selling of cereals and beef cattle.
iii. The association is organized with about ten small farmers in order to develop activities such as cereals cultivation, and beef cattle raising.
iv. With regard to beef cattle production, European and American breeding stock is introduced and farmers operate the farming from breeding to fattening in order to free themselves from the local beef cattle and traditional production methods. New bred cattle shows the high increase rate of body weight and the broad shortening of fattening period can be obtained by supplying excellent irrigated pasture even in dry season.
v. Besides, introduction of European and American breeding stock means the start of a run towards export of beef after stamping out the foot and mouth disease from Tocantins.
vi. The objective of the pilot farm is to verify the sustainability of crop rotation farming between cereals and pasture plants, cost reduction through farm machinery common use, high yield of cereals and pasture by irrigation in dry season, of high production of beef cattle by improved cattle and profitability in the neighborhood of middle size farmer incomes, and extension of sustainable agriculture and farm design and efficient farm management for the following regional agricultural development.

3) Integrated Cereals and Beef Cattle Production Farming by Middle and Large Scale Farmers

The program contents are as follows;

i. The pilot farm is selected among large farms in the northern region, the central southern region and the southeastern region, respectively.

ii. The objective of the pilot farm is to verify the sustainability of rotation farming between cereals and pasture, of high yield of cereals and pasture by irrigation in dry season, of high production of beef cattle by improved cattle and of their profitability, and extension of sustainable agriculture and farm design and efficient farm management aiming at the agricultural development in a regional basis.

iii. With regard to beef cattle production, European and American breeding stock is introduced and farmers shall operate the farming activities from breeding to fattening in order to free themselves from the local beef cattle and traditional production methods. New bred cattle shows the high increase rate of body weight and the broad shortening of fattening period can be obtained by supplying of excellent irrigated pasture even in dry season. Besides, introduction of European and American breeding stock means the start of run toward export of beef after stamping out the foot and mouth disease of livestock in Tocantins.

4) Fruits Production in Tocantins State

The program contents are as follows;

i. The pilot farm is selected among small farms in the Bico do Papagaio, the northern region, the central southern region, Jalapão in the eastern region, and the southeastern region, respectively.

ii. The objective of the pilot farm is to verify the sustainability of fruits growing in Tocantins, taking environmental preservation aspects in consideration, and the profitability of this activity, besides the extension of sustainable fruits farming, farm design and efficient farm management, the planing of environmental protection areas for the agricultural development in a regional basis.

(3) Justification, Background and Necessity of the Project

1) Integrated Vegetables and Swine Production Farming by Mini and Small Farmers in Suburbs

Many small farmers, with farm areas smaller than 320 ha are making their living by subsisting farming at burnt fields because of lack of funds or insufficient funds. Their poverty is one of the big social problems the government is facing, being difficult to be solved through the present financing conditions. Furthermore, many environmental problems are also verified, such as burnt field, soil degradation and erosion caused by reckless field management. This program is one of the means of solving these problems and contributing for the urban environment by making green belt of vegetables and cereals in the suburbs of towns.

2) Integrated Cereals and Beef Cattle Production Farming by Small Farmers

The present condition of meat cattle raising in the State is object of concern. The traditional and extensive way in which it is being conduced is producing several environmental problems, reducing the productivity of pastures and, consequently, stagnating the livestock raising sector. Therefore, the integrated production system of agriculture and livestock and technological upgrade proposed in this Sub-program will contribute to the improvement of the sector present conditions, besides the contribution for the solution of socio-economic problems mentioned in the previous item.

3) Integrated Cereals and Beef Cattle Production Farming by Middle and Large Scale Farmers

At present, the majority of medium and large scale farmers, owning more than 320 ha, are implementing the Nelore cattle raising. Those located in good geomorphological conditions lands are carrying out fattening or integrated raising. The others are carrying out cattle raising for breeding purposes. Nevertheless, in both cases the extensive system, utilizing natural pastures deriving from deforestation or artificial pastures, is utilized. Almost all the pastures, due to mismanagement or erosion, are suffering a reduction in the grazing capacity, which requires an urgent solution. The land burning process, annually repeated after the dry period, is also another worldwide known environmental problem.

Likewise the previous mentioned Sub-program, this one aims at finding a solution to the present stagnation condition of the livestock raising activity in the State.

4) Fruit Production in Tocantins State

As already mentioned, the small farmers are facing many difficulties in developing their activities. Therefore, this Sub-program aims at helping them in facing these problems, i.e., poverty and environmental degradation, through the introduction of fruits cultivation in unsuitable land for cereals and vegetables.

(4) Details of the Project

1) Integrated Vegetables and Swine Production Farming by Small Farmers in Suburbs

(i) Location

The pilot farm is organized in each suburb (zone) of Araguaína, Palmas and Gurupí.

(ii) Plan

i. The association of each zone is organized with ten farmers, who own in average 35 ha of cultivated land, ranging from 20 ha to 50 ha (from 40 ha to 100 ha including the environmental preservation area).

ii. The association manages the use and the maintenance of farm machinery and irrigation facilities, supply of piglets and formula feed, and commercialization of cereals and swine.

iii. Each farmer selects the kind of vegetables in each season, considering market prices, and cultivates it in 4 ha, utilizing irrigation facilities, such as drip irrigation facility, furrow irrigation facility, etc., cultivating even during the dry season. Selected vegetables can be tomatoes, sweet melon, onion, potatoes, carrot, etc., which are largely consumed in Tocantins.

iv. In the remaining 31 ha, each farmer shall cultivate maize for feeding animals during wet season, and millet as cover crop during dry season to prevent soil erosion and to supply organic matter to it. In the 4 ha field, vegetables will be cultivated in one year (2 harvests) and maize in 7 years (7 harvests), which means a crop rotation between vegetables and maize.

v. Total maize cultivation area of 10 farmers in the association is 310 ha, and farm works of maize cultivation will be carried out collectively utilizing farm machinery managed by the association.

vi. The produced maize is used with priority for swine feeding -150 heads per farmer - and the surplus is sold. The necessary amount for fattening is about 250 kg/head per year, therefore, the total amount for 150 heads of each farmer is about 38 tons. If maize yield is 3 tons per ha, of the produced amount of maize by each farmer in 31 ha is 93 tons, therefore a surplus of 55 tons can be sold.

vii. The produced maize is sent to the feed mixture factory, which is managed by the association. The association feed mixture factory produces formula feed for swine and distributes it to the 10 farmers.

viii Swine is produced under contract within the association and 10 farmers. The association produces piglets by triple cross within improved varieties, such as Large Yorkshire, Landrace, Duroc, etc., in the breeding farm, supplying piglets to 10 farmers after weaning (2 months from birth). The farmers can fatten 50 piglets for 4 months at a time, amounting to 150 heads in three times during a year.

viii. The association breeding farm has 100 heads of adult female swine and 5 heads of adult male swine, and 105 tons of maize are consumed by these breeding swine.

Required Funds

The required fund for one association is shown in the following table:

Items	Quantities
1) Land Consolidation Cost	ha
2) Irrigation Facilities Cost (Water Storage tank, pump, piping, irrigation set)	units
3) Farm Machinery Cost	
Tractor 128 HP, 4WD	2 units
Tractor 85 HP, 2WD	2 units
Combine and Attachments	unit
4) Building and Facilities Cost	

Warehouse (60 m^2)	10 units
Swine Breeding Barn (700 m^2)	1 unit
Swine Fattening Barn (200 m^2)	10 units
Farm Machinery Shed (600 m^2)	1 unit
Workshop for Machinery (100 m^2)	1 unit
Compost Shed (25 m^2)	10 units
Simple feed mixture Factory (200 m2, with grinder, mixture etc.)	1 unit
Silo for Maize (600 ton)	1 unit
Simple Slaughter House (300 m^2)	1 unit
5) Initial Running Costs	
Cost for Vegetable Growing /ha	40 ha
Cost for Maize Cultivation /ha	310 ha
Purchase Cost of Breeding Swine	105 heads
Feeding Cost for Swine	
Medicine Cost for Swine	
Total Cost	R$ 1, 276, 600

2) Integrated Cereals and Beef Cattle Production Farming by Small Farmers

(i) Location

i. Some area with easy access to local main roads within Araguaina municipality
ii. Some area with easy access to local main roads within Palmas municipality
iii. Some area with easy access to local main roads within Gurupi municipality

(ii) Plan

The association of each zone is organized with ten farmers, and each farmer owns in average 160 ha of cultivated land (320 ha including the environmental preservation area). This cultivated field is covered with 2 Center Pivot systems (80 ha each) to cultivate cereals and pasture even during dry season. The association manages the use and the maintenance of farm machinery and irrigation facilities, and commercialization of cereals and beef cattle.

i) Crop cultivation

Each farmer cultivates rice, soybeans, maize and feijão beans, etc. for saling and seeds production, in 40 ha of half of the Central Pivot field (80 ha). Besides, millet as cover crop is cultivated during dry season to prevent soil erosion and to supply organic matter to it. These crops are cultivated 7 to 8 times (harvests) in 2 years and are followed by pasture cultivation for grazing for 9 years. After these 3 years of cereals cultivation, cereals cultivation shifts to the other half of the Central Pivot field.

Every year, each farmer cultivates cereals in 40 ha and pasture in 120 ha, in which around 520 heads of breeding cattle and fattening cattle graze at a time.

The rotation between cereals and pasture prevents the soil degradation. Besides, the following measures against soil degradation and soil erosion are adopted in the program;

a) Cereals cultivation in wet season

In wet season, we can not control rainfall. Therefore, measures against soil erosion are indispensable.

- After the first crop is cultivated under irrigation in dry season, cover crops, such as millet, crotalaria, etc., are cultivated and grow up to full size until the early stage of wet season.
- Cover crops are chopped and scattered on soil surface, and cereals are sown with no-tillage seeding machine.

b) Cereals cultivation in dry season under irrigation

In dry season, we can control the irrigation intensity to prevent soil erosion.

- As a rule, after crops in wet season are harvested, soil is tilled and next crops are sown.
- After first crop is cultivated under irrigation in dry season, cover crops, such as millet, crotalaria, etc., are sown.

Total cereals cultivation area of 10 farmers in the association is 400 ha, and farm works of cereal cultivation are carried out collectively with farm machinery managed by the association.

ii) Beef cattle production

In order to free from the local beef cattle (Nelore) traditional production methods of fattening of purchased calves, the program aims at the diversification of beef cattle production as described hereinafter.

An integrated raising method costing of breeding, re-breeding and fattening of exotic races deriving from the first generation of "Sinmental", "Limousin" and "Santa Gertrudes" races and matrixes of the "Nelore" race crosses is introduced. The obtained results in the demonstrative units can be also utilized in the definition of the most adaptable crossing for the State.

New bred cattle shows a higher increase rate of body weight and the broad shortening of fattening period can be obtained by supplying excellent irrigated pasture even during the dry season. It is estimated that the new bred cattle can obtain 350 kg to 400 kg of body weight within 30 months from birth. Beef cattle production through hybrid crosses results in high quality of meat, high breeding efficiency and possibility of meat export after stamping out the foot and mouth disease. Raising methods are as follows;

(a) 300 heads of fattening cattle graze in 60 ha of irrigated pasture at a time. 150 heads of beef cattle, 350 kg to 400 kg of body weight, are sold after 30 months from birth, every year. The grazing capacity of the field is 5 heads per ha.
(b) The remaining 60 ha is used for 216 heads of breeding cows, 6 heads of breeding bulls,

amounting to 222 adult cattle heads, and calves until weaning time (6 months from birth) at a time.

(c) 35 heads of breeding cows are allocated for one bull (one group). The total breeding cattle is divided into 6 groups. 10 ha of the irrigated pasture is allocated to each group. The grazing capacity of the field is 3.7 heads per ha.

In general, the conception rate and calving interval of Nelore is 60 % and 18 months, respectively. On the other hand, the program new technology improves these items to 70 % and 16 months, respectively. Also the mortality rate among calves is reduced by hybridization. Furthermore, the fattening shorter time results in tender meat, improvement of meat color and taste, amount of meat and dressing percentage. Therefore, in the present situation, in which there is no classification of cattle meat, it should be commercialized through associations to registered butcheries, hotels and restaurants or, if necessary, associations own butcheries shall be created in urban centers. Anyhow, the existing processing plants shall be contracted to process the meat.

Required Funds

The required fund for one association is shown in the following table:

Items	Quantities
1. Land Consolidation Cost/ha	1
2. Irrigation facilities Cost (Water Storage tank, Pump, Center Pivot System)	
Electric Fence in Irrigation Fields	
3. Farm Machinery Cost	
Tractor (128 HP, 4WD)	2 units
Tractor (85 HP, 2 WD)	2 units
Combine and Attachment	1 unit
Machinery Attachment	1 unit
Power Sprayer tank 2,000 lit	1 unit
Power Sprayer tank 400 lit	1 unit
Truck (5tons) for transport of feed, swine	1 unit
4. Building and Facilities Cost	
Warehouse (60 m2)	10 units
Farm Machinery Shed (600m2)	1 unit
Workshop for Machinery (100m2)	1 unit
Fence	1 unit
5. Initial Running Costs	
Cost for Rice Cultivation/ha	
Purchase Cost for Cattle	
Feeding Cost for Cattle	
Medicine Cost of Cattle	
Total Cost	R$ 3335500

3) Integrated Cereals and Beef Cattle Production by Farming Middle and Large Scale Farmers

(i) Location

1. Some area with easy access to local main roads within Araguaína municipality

2. Some area with easy access to local main roads within Palmas municipality
3. Some area with easy access to local main roads within Gurupí municipality

(ii) Plan

The pilot farm is selected among large scale farms, around 1,000 ha of cultivated land (2,000 ha including the environment preservation area), located in the northern region, the central southern region and the southeastern region, respectively. 160 ha of each farm is covered with 2 Center Pivot systems (80 ha each) to cultivate cereals and pasture even during dry season. The remaining 840 ha does not have irrigation facilities.

i) Crop cultivation

Each farmer cultivates rice, soybeans, maize and feijão beans, etc. for saling and seeds production, in 40 ha or half of the Center Pivot field. Besides, millet as cover crop is cultivated in dry season to prevent soil erosion and to supply organic matter to soil. These crops are cultivated 7 to 8 times (harvests) in 2 years and are followed by pasture for grazing for 9 years. After these 3 years, the field of cereals shifts to the other half of the Center Pivot field.

Every year, each farmer cultivates cereals in 40 ha and pasture in 120 ha in the irrigated field, in which around 600 fattening cattle heads graze at a time. Once cereals in 40 ha of irrigated field are cultivated at least three times a year, the total area of cereals cultivation in the irrigated field is 120 ha or more.

On the other hand, the 840 ha of non irrigated field is divided into 9 blocks of 95 ha each which will be alternated between pasture and cereals cultivation. Cereals such as maize and soybean are going to be cultivated during 3 years, followed by 6 years of pasture cultivation. The number of blocks destined to cereals production will be annually increased with 1 block until reaching 3 blocks, which will be permanently maintained. Therefore, in the first year, around 95 ha of cereals will be cultivated, 190 ha in the second year, and from the third year on approximately 285 ha will be annually cultivated during the rainy season.

Therefore, the total cereals cultivation area, irrigated and non irrigated areas all togehter, in the farm is 405 ha or more. In order to cope with shortage of roughage during the 4 months of the dry season, a part of the non irrigated field (55 ha) will be cultivated with maize and sugar cane for silage or directly feeding at the trough. Therefore, the actual total area of cereals cultivation is 350 ha.

The rotation between cereals and pasture prevents the soil degradation. Besides, the measures against soil degradation and soil erosion adopted in the program are as follows;

(a) Cereals cultivation in wet season

In wet season, we can not control rainfall. Therefore, measures against soil erosion are indispensable.

After first crop is cultivated under irrigation during dry season, cover crops, such as millet, crotalaria, etc., are cultivated and grow up to full size until the early stage of wet season. Cover crops are chopped and scattered on soil surface, and cereals are sown with no-tillage seeding machine.

(b) Cereals cultivation in dry season under irrigation

In dry season, we can control the irrigation intensity to prevent soil erosion. As a rule, after crops in wet season are harvested, soil is tilled and next crops are sown. After first crop is cultivated under irrigation in dry season, cover crops, such as millet, crotalaria, etc., are sown.

ii) Beef cattle production

The conditions which motivate the introduction of cattle raising diversification are the same as mentioned in the Integrated System of Cereals Cultivation and Cattle Raising for Small Farmers.

Raising methods are as follows;

(a) 600 heads of fattening cattle graze 120 ha of irrigated pasture at a time. The grazing capacity of the field is 5 heads per ha.
(b) 650 heads of fattening cattle graze 170 ha of non irrigated pasture at a time. The grazing capacity of the field is 4 heads per ha.
(c) Therefore, the total number of fattening cattle is 1,250 heads at a time. 6,250 heads of beef cattle, 350 kg to 400 kg of body weight, are sold within 30 months from birth every year.
(d) The remaining 400 ha of non irrigated pasture, out of the total of 570 ha, is used for 960 heads of breeding cows, 40 heads of breeding bulls, amounting to 1,000 heads of breeding adult cattle, and for calves until weaning time (6 months from birth) at a time.
(e) 24 heads of the breeding cow are allocated for one bull (one group). The total breeding cattle is divided into 40 groups. 10 ha of the irrigated pasture is allocated to each group. The grazing capacity of the field is 2.5 heads per ha.

In general, the conception rate and calving interval of Nelore is 60 % and 18 months, respectively. On the other hand, the program new technology improves these items to 65 % and 16 months, respectively. Also the mortality rate among calves is reduced through hybridization.

Required Funds

The required fund for each farmer is shown in the following table:

Items	Quantity
1. Land Consolidation	

2. Irrigation Facility (Water Storage Tank, Pump, Piping, Central Pivot System)	10
Electric Fence in Irrigation Fields	
3. Farm Machinery	
Tractor (128HP, 4WD)	2 units
Tractor (85 HP, 2 WD)	2 unit
Combine	1 unit
Combine Attachment	1 unit
Power Sprayer Tank 2,000 lit	1 unit
Power Sprayer Tank 400lit	1 unit
Truck (5 tons for transport of feed, swine)	1 unit
4. Building and Facilities Cost	
Warehouse (60 m2)	10 units
Farm Machinery Shed (600m2)	1 unit
Workshop for Machinery (100m2)	1 unit
Fence	
5. Initial Running Costs	
Cost of Rice Cultivation	400 ha
Medicine Cost of Cattle	
Total Cost	R$ 1, 105, 500

4) Fruits Production in Tocantins State

(i) Location

The location of this Sub-program shall be as follows;

i. Bico do Papagaio region
ii. The suburbs of Filadélfia in the northern region
iii. The suburbs of Palmas in the central southern region
iv. Jalapão in the eastern region
v. The suburbs of Aurora in the southeastern region

(ii) Plan

The pilot farm is selected among small farms, with 20 ha of cultivated land with fruit trees (40 ha including the environment preservation area), in locations with easy access to local main roads in each region. The orchard is equipped with drip irrigation facilities which allows cultivation even during the dry season. In order to prevent soil erosion, barriers will be constructed along contour lines as well as underbrush will be planted, being periodically treated.

In each farm orchard, farm roads are going to be open in order to carry in the farm materials, to control pests and diseases by machines, to cut the bottom grass, to carry out fruits, etc. Besides that, each farm will have a workshop to grade fruits, to pack them inside boxes and to temporary storage the fruits, as well as farm machinery shed and farm materials shed. The kinds of fruits are selected by farmers from the suitable fruit trees in each region including fruits for local consumption, such as Buriti, Pequi, Gariroba (Palmito), etc.

Required Funds

The required fund for a farmer is shown in the following table:

Items	Quantities
1. Land Consolidation and Farm Road	20 ha
2. Irrigation Facilities (Water Storage Tank, Pump, Piping, Irrigation System)	20 ha
3. Farm Machinery	
Tractor (25 HP, 4 WD)	1 unit
Attachment	1 unit
Truck (2 tons)	1 unit
4. Building and Facilities	
Warehouse (100m2)	1 unit
Farm Machinery Shed (100m2)	1 unit
Workshop (200m2)	1 unit
5. Initial Running Cost	
Cost of Fruits	20 ha
	R$ 249, 500

(5) Project Implementation Methodology

In implementation of the sub-programs, it is necessary to take account the following items;

- The presence of the small scale farmers should introduce the center pivot irrigation systems for their fields only near the water resources to reduce the costs of driving channels.
- To proper in the regional development, the middle and large scale farmers, who can employ the technical supervisors of their farms, should give the technical assistance to the small scale farmers, and cooperate with the small scale farmers in the economical activities, such as purchase of farm materials, marketing etc.

Based on the basic concept of the Green Village Program, it is possible to plan an agricultural and livestock development suitable to any conditions introducing technologies adopted to natural and farmer's conditions, making possible a low cost production. That is through the Pilot Farms, it will be possible to elaborate several alternative Programs as follows;

1) Integrated Vegetables and Swine Production Farming by Small Farmers in Suburbs

Terms of financing:

i. Organization of associations for common use of farm machinery and agricultural facilities, as well as for commercialization of products;
ii. Rotation between vegetables and forage crops and countermeasure against soil erosion; and
iii. Introduction of European and American breeding swine.

Subjects of financing:

i. Land consolidation;
ii. Farm machinery and facilities for common use;

iii. Irrigation facilities;
iv. Facilities of swine raising; and
v. Acquisition of European and American breeding stocks.

2) Integrated Cereals and Beef Cattle Production Farming by Small Farmers

Terms of financing:

i. Organization of association for common use of farm machinery and agricultural facilities, as well as for commercialization of products;
ii. Rotation between cereals and pasture as well as countermeasure for soil erosion; and
iii. Introduction of European and American breeding stocks.

Subjects of financing:

i. Land consolidation;
ii. Farm machinery and facilities for common use;
iii. Irrigation facilities;
iv. Electric fence and ordinary fence for pastures;
v. Acquisition of European and American breeding stocks; and
vi. Acquisition of Buffaloes.

3) Integrated Cereals and Beef Cattle Production Farming by Middle and Large Scale Farmers

Terms of financing:

i. To introduce rotation between cereals and pasture, as well as erosion control measures;
ii. Introduction of European and American breeding stocks; and
iii. Introduction of buffaloes raising.

Subjects of financing:

i. Land reclamation;
ii. Farm machinery for cereals production;
iii. Irrigation facilities;
iv. Electric fence and ordinary fence for pastures;
v. Acquisition of European and American breeding stocks; and
vi. Acquisition of Buffaloes.

4) Fruit Production in Tocantins State

Terms of financing:

i. Organization of association for common use of farm machinery and agricultural facilities, as well as for commercialization of products; and
ii. Countermeasure for soil erosion in orchard.

Subjects of financing:

i. Land consolidation;
ii. Introduction of fruit trees;

iii. Countermeasure for soil erosion in orchard;
iv. Farm machinery and facilities;
v. Irrigation facilities;
vi. Workshop to grade fruits, to pack and to storage temporarily, farm machinery shed and farm materials shed.

Coverage

This Sub-program aims at the medium and large-scale farmers, those with lands around 400 ha in size.

Subjects of financing;

i. Acquisition/installation of adequate irrigation system, up to 100 ha;
ii. Acquisition of machinery and attachments;
iii. Acquisition of breeding stock and respective infrastructure; and
iv. Acquisition of agricultural inputs (lime, fertilizers, seeds, seedlings, livestock feeds) until the first harvest.

Terms of Financing;
The project execution shall fulfill the following technical requirements;

i. The implantation shall be carried out gradually, according the applicant capacity. As a suggestion, the following management is proposed: 50 ha of crop and 150 of pasture (1st year), 50 ha of crop, 100 ha of pasture and 50 ha of fruit cultivation (2nd year), and 100 ha - 85 ha of pasture and 15 ha of crop - pasture restoration (3rd year), i.e., 75% of pasture and 25% of agriculture (1st year); 25% of fruit cultivation, 50% of pasture and 25% of agriculture (2nd year); 50% of fruit cultivation, 42.5% of pasture and 7.5% of pasture restoration - agriculture (3rd year).
ii. Due care concerning to soil, water and vegetal coverage conservation shall be taken.

To apply for financial resources some measures shall be taken, namely;

i. The project shall be analyzed in a global way within the productive unit.
ii. The available resource for each applicant is limited in R$ 100,000.00, according to his repayment capacity, equivalent to 80% of the estimated gross income.
iii. The access to credit will be through a technical project elaborated by duly authorized institution, which will submit it to the CMDR (Municipal Council of Rural Development) and to the financing agent.
iv. The credit application follow up will be carried out through inspection visits to be carried out during the project execution.
v. The repayment will be established according to the agreement, the grace period depending on the start of production/commercialization, the repayment term being up to 15 years.

4.4 Demonstration Program

(1) Outline

In the State of Tocantins, besides the extensive activities of animal husbandry and production of rice, intensive agricultural farming activities such as cultivation of soybean, pine apple etc. are increasing recently. However, the State of Tocantins which is located in the Amazons legal area has restricted development policies. Considering this fact, and the existence of an Indigenous reservoir, the Bananal Island 'one of the humanity patrimony', there is a necessity to establish of an environmental preserved system and sustainable development is urgently needed for the State Agriculture and livestock Development.

The demonstration program is developed based on the objective of collecting the necessary data and information for sustainable agriculture development and the measures required for the preservation of environment. Based on these data and information, suitable farm design method and farm operation method will be developed for the various regions of the State in cooperation with the State and Federal Government, and the farming population.

In the demonstration farm, which will be constructed as a part of the demonstration program, the method of sustainable agriculture and livestock development, planning for the appropriate development, methods of environmental preservation and environmental monitoring will be examined through experimental trails. And the results of the studies at the demonstration farm will be applied to the model farms which will be located at the various regions in order to study the applicability for each region.

There are many technologies in Brazil, which were elaborated by research institutions and universities, and these technologies may be introduced and adapted to the conditions of Tocantins State. The Demonstration program is formulated based on the idea of introducing these technologies to the agriculture and livestock development of the State, considering the economic, social and environmental aspects, so as to produce the favorable impacts on the development.

With regard to the research aspects, it is insisted that the demonstration farm will mainly focus on the applied research and not on the basic research. The suitability of application of the researches which were conducted at the various research stations such as EMBRAPA and the universities shall be researched at the demonstration farm. Mostly the researches which can have an immediate adaptation and a higher feasibility to be implemented in the various regions of the State shall be conducted.

The rural producers/farmers of the State of Tocantins play a fundamental role in this program, since this program focuses on this specific population. Therefore, the elaboration of this demonstration program shall coincide with the demand and the activities of the state rural farmers and the availability of technology to develop these activities. In order to meet the demand of technology of the rural farmers, the

technologies which are available in the state, the country and the other foreign countries shall be verified. When there is no suitable technology readily available, and the demand for that technology is very important, an experimental cultivation in order to meet demand shall be developed. Apart from this main demand of the Demonstration Program, it is also expected to introduce new technologic innovations in order to provide new investments and marketing opportunities to the agricultural and livestock sector of the State.

The optimum farming design method and farm operation method which are developed at the demonstration farm shall be disseminated to the farmers and others who are engaged in agriculture and livestock farming through training and extension. Apart from disseminating the technology to the farmers at the various regions, the major problems of these regions in agriculture and animal husbandry will also be fed back to the demonstration farm and the suitable solutions will be researched at the demonstration farm.

The main aim of the training and extension program is to strengthen the vocational training for farming community and extension staff of SAG and RURALTINS who are responsible for the extension activities of the agriculture and livestock sector of the State of Tocantins. The program shall be based on the demonstration cultivation technologies which are carried out at the demonstration center and can be adapted to their regions. RURALTINS will make necessary arrangements in contacting and selecting the farmers and others who need training at the demonstration farm.

Apart from the focus on the demonstration training, and extension, the demonstration farm will also conduct studies on the impacts of the development of agriculture and animal husbandry on the environment. Besides, the various environmental preservation methods and soil preservation methods will be researched at the demonstration farm so as to promote sustainable agriculture development.

In the demonstration farm, it is also planned include to four laboratories, viz. soil laboratory, seed laboratory, biotechnology laboratory, and plant protection laboratory. Although the State of Tocantins has a good potential for agriculture and livestock development with suitable conditions of climate, the productivity level is low, since the farmers adapt low level of technology such as improper fertilizer applications and poor seedlings, improper plant protection measures etc. because of no suitable laboratory facilities available in the state. Even for a detailed soil analysis, they have to send their soil samples to the neighboring states which not only costs more but is also time consuming.

Therefore, the above mentioned laboratory facilities which are planned to be included in the demonstration farm will not only cater the needs of the research and demonstration activities of the demonstration farm, but also will be useful for rending the different kind of testing service to the farming community. Besides, good and higher genetic quality seeds and seedlings can be supplied to the farmers and can guarantee pests and disease free seedling which can give a higher production.

From all these various kinds of activities of the demonstration farm, the technical data which will be accumulated will be processed further to assess for the further development of the State of Tocantins.

(2) Objectives

The prime objective of the demonstration program is to identity the agricultural development methods and development models which are suitable for each region of the State for sustainable agriculture and livestock development while focusing on the environmental preservation.

And the optimum farming design method and farm operation method which are developed at the demonstration farm shall be disseminated to the farmers and others who are engaged in agriculture and livestock farming through training and extension. With these prime objectives the specific objectives can be detailed as follows :

1) To collect the data and information from various research organizations/ sources on the various farming methods and agriculture/animal husbandry techniques in accordance with the demand of the state and the region

2) To conduct the research at the demonstration farm to verify the suitability of these technologies to the state and to develop farm design method and farm operation method which are suitable for each region

3) To conduct the demonstration and verification at the model farms which are located at the various regions

4) To conduct extension and training to disseminate the suitable cultivation technology to the farmers and the extension personals of the various regions

5) To conduct monitoring and evaluation to study the environmental and social impacts at the various regions

6) To provide laboratory testing & analysis services to the farming community which include soil analysis, product quality analysis, plant protection, seed and biotechnology

In the demonstration program, it is designed to introduce integrated swine breeding and integrated production of chicken and eggs. The specific objectives in regard to these integrated demonstration programs are as follows :

1) To increase the production of swine culture in the state in order to cover the domestic demand and to export to international markets

2) To promote, modernize and integrate to other activities such as poultry farm, fish

breeding, beef and milk cattle

3) To promote the diversification of farming of small farmers towards combined agriculture/animal husbandry farming

(3) Background, Justification and Necessity of the Program

The base of the Tocantins State economy is faced towards the agriculture and livestock sector. However, the present agriculture and livestock farming in the State depends on traditional farming practices and livestock breeding systems and this situation constrains the increase in the productivity of agriculture and livestock sector. Besides, traditional practices like 'clearing the land by burning' (practice of 'Queimadas') also creates a serious problem of environmental degradation. Apart from this, there are also other environmental problems such as soil erosion, which are caused by traditional farming and low level of technology in farming. There is an urgent need to introduce adequate technologies in order to improve this sector in quantity and quality and to prevent the environmental degradation. It is also necessary to improve this sector to the same competition level with the other states of the country in order to avoid the regional imbalances in the country. The great diversity of climate and soil in the State is demonstrating the importance to develop researches and to adapt suitable technologies for each region.

After the creation of Tocantins State in 1989, a diversification trend of rural activities is being observed. Before the formation of the State, the basic production were mainly beef and rice; however, at present others activities such as production of soybean, corn, pisciulture, poultry farm, swine breeding, fruit-culture, etc. are being developed. Taking into account of the growing and diversification of investments for rural activities, it is necessary, besides the research activities, the demonstration of technique which shall improve the quality and yield of products trying to decrease the environmental impacts and improving the farmers welfare.

Considering all the above factors, it is planned to introduce a new technology of combining both agriculture and livestock in a single farming system. Traditionally, livestock farming is carried out in big farms while agriculture farming is carried out mainly as a subsistence farming. By introducing this kind of technology, it will not only be possible to increase the quantity and quality of agriculture and livestock sector, but also will be possible to preserve the environment since the new technology will facilitate to improve the soil conservation. Already there are other farms who are following this technology in the other states of the country. However, before introducing this technology to the farms of the state, there is a need to research and verify the adaptability and the demonstration program is formulated to meet this purpose.

Research on crop-pasture rotations for tropical cerrados is still in the initial stage. Yet, it may be this approach of integration which could contribute more to ecologic and economic sustainability of crop and livestock production systems in the tropics than any

other single innovation. Each has problems when standing alone and yet most of the problems can be solved by rotating the crops with pastures. Among the more important benefits :

- enhanced soil fertility
- increased biological activity
- more efficient nutrient cycling
- enhanced soil physical properties
- improved dry season feed quality and availability
- more effective soil and water conservation and use

With regard to livestock farming, it is also necessary to diversify the activities such as promotion of integrated program of swine culture and poultry farming. In Brazil, the northern region has approx. 7% of the swine population and the State of Tocantins has a swine population of 660,552. However, swine breeding is carried out in the State without adequate technology with low genetic quality and low productivity and does not meet the local demand. However, it is possible to increase the productivity of swine production by integrating swine culture with agriculture and by which the corn and soybean produced in the farm can be used as the feed for the swine breeding. The State of Tocantins also has a high demand for the caipira chicken and eggs because of its higher quality. There is need to increase the poultry production through integrated farming activities.

In the Demonstrative Program, it is intended to create a Demonstration Center for Agriculture, and Livestock Development which shall be a pilot-project which attends the demand of the rural production sector. This Program may show new technologies to improve the development of sustainable agriculture and livestock with the minimum environment impact.

Furthermore, the lack of enough information and knowledge on suitable farm management of crop cultivation and animal husbandry among the farming community and the extension staff also lead to mismanagement . It also hinders the development of regional agriculture. Therefore, in line with the integrated development plan of agriculture and livestock, it is also necessary to introduce the technical training program to the farming community and the extension staff as a part of the demonstration program.

By implementing the program, the strengthening of extension activities will be realized, and smooth technical transfer to farm producers also will be feasible. It will contribute to the increase of agricultural productivity, introduction of new crops, and promotion of livestock industry. Besides, considering the rural farming population and the urban population, there is a great difference between the rural life environment and the urban environment. The new technology is expected to contribute for the development of new agriculture based business and industries which is expected to make a significant contribution for the development of rural region of the state.

Apart from the focus on the demonstration and training, there is also a necessity to focus on the impacts of the development of agriculture and animal husbandry on the environment. As discussed before, the new technologies which will be experimented and demonstrated at the demonstration farm are expected to contribute significant positive impacts on the environment. However, the environmental including the social impacts which will be generated by these projects should be evaluated, analyzed, classified and quantified. If at all, there will be any significant negative impacts caused by these developments suitable alternatives should also be researched and identified at the demonstration farm.

(4) Details of the Demonstration Program

1) Creation of Demonstration Center

In order to demonstrate the technologies to professionals and farmers, it is necessary to construct a demonstration center with all the related facilities of buildings and of permanent equipment (laboratories, automobiles, agriculture implements, irrigation etc.) The Demonstration Center shall be named as **Demonstration Center of Technology for Agriculture, and Livestock Development of the Tocantins State.** The demonstration center may have the following four basic functions :

- Research and Demonstration of Technology,
- Transfer of Technology through training,
- Extension and Environmental Monitoring, and
- Laboratory testing and seed supply service.

The contents of each function are mentioned below :

2) Contents

(i) Research and Demonstration Works

i) Agriculture

- Crop rotation (Pasture and Crop)
- Selection of suitable varieties of pastures
- Soil conservation technology
- Cultivation of leguminous crop and green fertilizers
- No- tillage cultivation and cultivation with minimum inputs
- Farming pattern suitable for Amazons legal area
- Selection of suitable crops and vegetables
- Cultivation technology
- Selection of fruit cultivation

ii) Livestock

- Selection of swine breed and cross breeding
- Adaptability of swine feed and feeding system
- Effective swine disease control program

iii) Agriculture and livestock

- Integrated production of meat cattle and grains
- Integrated production of greenery and livestock around urban centers
- Integrated swine breeding
- Integrated poultry farming

(ii) Transfer of Technology through Extension and Training

The technology transfer will be carried out through the following major activities of extension and training as shown below :

- Demonstration and Extension of Sustainable Agriculture Model
- Explanation and Publication of Results
- Training for the farming community
- Extension activities for the farming community
- Technology transfer for the SAG and RURALTINS staff
- Demonstration of application of agricultural inputs
- Distribution of seedlings and seeds

As discussed already, the training and extension of the demonstration program focus on the following two aspects.

i) Training program for the farming community
ii) Training program for SAG, RURALTINS and Extension staff

i) Training program for the farming community

The training program will be prepared in the following fields by the technical staffs of the demonstration center in collaboration with RURALTINS,UNITINS and the relevant institutions such as EMBRAPA.

- Technologies of soil conservation and prevention of soil degradation in order to perform sustainable agriculture, environmental preservation, increase of yield and improvement of quality, reduction of production costs, and animal hygiene
- Method of mechanized cultivation for cereals and pastures
- Technologies of post-harvests
- Technologies of vegetables and fruit cultivations, and animals and poultry raisings
- Methodologies of operation and maintenance of irrigation facilities and farm machinery and their utilization techniques (operation)
- Method of establishment and management of farmers' organization
- Method of farm household management and farm bookkeeping

- Rural life improvement (nutrition, health and hygiene, education, income generation, home economics, etc.)

ii) Training Programs for SAG, RURALTINS and Other Extension Staff

Since the extension staff are the main people who are responsible for the extension activities of the above technology, the training on the above subjects shall also be conducted to the extension staff. Apart from this training, the following aspects shall also be included :

- Methodologies of design on regional development plan, farm design, and farm management design, and technical and managerial evaluation of farming
- Study method of soil property and formulation of right land for crop and fruit cultivations
- Agricultural information system and marketing information
- Social assistance system and its evaluation
- Others including advanced farming technologies

iii) Extension Activities

The demonstration farm will diffuse the technologies of sustainable agriculture and livestock development through training and extension work. The extension work shall be carried out by the staff of SAG who will be appointed at the regional offices in cooperation with the RURALTINS.

The demonstration cultivation can be carried out at the farmer' s field (model farms) which will be identified at the various regions of the state. Through these extension activities, it would also possible to identify the major specific problems with regard to each region which can be fed back to the demonstration farm to identify the suitable solutions.

Besides, all the major findings and the technical information should be published as periodicals, agriculture video films, photograph panels. Besides exhibitions and workshops shall also be conducted at regular interval. In summary, the extension activities of the demonstration farm can be briefly listed as follows :

- Demonstration cultivation at the model farms
- Lectures and discussions at the farmers organizations
- Investigation of problems at the farms and their analysis
- Publication of technical manuals on cultivation technology
- Publication of periodicals regarding technical information
- Producing video films, photographic panels
- Conducting exhibitions and workshops

(iii) Environmental Monitoring and Environmental Impact Assessment

i) Impact Assessment of Agriculture and Animal husbandry on Environment
ii) Forest Conservation
iii) Soil Conservation including Erosion Control

Environmental monitoring and environmental impact assessment mainly focus on assessing the impact of agriculture and animal husbandry on environment. Besides, experimental research will be conducted at the demonstration and model farms to research on the environmental conservation methods such as erosion control by introducing suitable grass variety, cover crop etc.

(iv) Laboratory Services

i) Soil laboratory - provides services of chemical and physical analysis of soils and recommendations of fertilizer requirements and soil amendments

ii) Seed laboratory - Evaluate the real quality of seeds to verify cultural value, purity and germination index and to supply good quality seeds of high genetic values

iii) Biotechnology laboratory - To produce high genetic quality fruit seedlings as a result of laboratory production through in-vitro micro propagation system

iv) Plant protection laboratory - To analyze the pests and diseases and to recommend suitable plant protection measures

3) Location of Demonstration Center

In order to demonstrate for more number of visitors from different parts of the state including the farmers and others who are engaged in agriculture business, the Demonstration Center shall be established at Palmas which is not only the State Capital but also is located at the Center of the State. It also has a good access by road and by air.

The exact location (area) for the demonstration center shall be selected based on the following aspects :

- Detailed soil investigation should be carried out and the area which has good suitability for agriculture and animal husbandry should be selected.
- Area where is a near by water resource for irrigation shall be selected.
- The area for the demonstration center shall be easily accessible from Palmas and the infrastructure facilities such as roads etc. shall be available near the demonstration center.

4) Facilities Required

i) Research and Demonstration Farm

The total area of the demonstration farm shall be 800 ha. Among this 800 ha area, 400

ha area can be used for the demonstration farming leaving the 400 ha of environmental preservation area. The following activities shall be carried out at the demonstration farm

a) Cultivation of grains and pasture
b) Vegetables
c) Fruits
d) Integration of grains and cattle farming
e) Integration of grains and swine breeding
f) Reforesting
g) Fish breeding
h) Apiculture
i) Poultry farm
j) Goat breeding

These activities shall be developed integrally and one activity shall support and/or substitute the other activity in order to achieve the system which is ecologically sustainable and economically realistic.

ii) Irrigation Facilities

In order to facilitate continuous activities of the demonstration cultivations, the demonstration farm shall be provided with the following irrigation facilities :

- Central Pivot - 50 ha.
- Auto propelled irrigation - 10 ha.
- Drip irrigation - 20 ha.
- Micro sprinkler - 40 ha.
- Furrow irrigation - 5 ha.

Several crops shall be cultivated under these irrigation system in rotation with cattle activities (pastures) in order to demonstrate the advantages of each system.

iii) Buildings and Related Facilities

- Main Building - 650 m^2
  - classrooms (5)
  - work rooms (2)
  - TV room
  - library
  - administration room (2)
  - laboratories (3)
  - meeting room
- Dinning hall 200 m^2
- Bedrooms (30) 900 m^2
- Operational houses (3) 64 m^2 each one
- Warehouse - 60 m^2

- Silo - 300 ton.
- General Store - 300 m^2
- Food industry - 200 m^2
- Machinery Maintenance area 100 m^2
- Closed Shed - 600 m^2
- Open Animal shed - 425 m^2
- Beehives - 20
- Installation for poultry 125 m^2
- Pigsty - 200m^2
- Sheepfold - 100 m^2
- Mini-industries (3) (beef/milk/fruits)
- Power Station
- Pumping Station (4)
- Pisciulture tank 1-ha
- Well (2)
- Rural telephone kit
- Parabolic antenna for meteorological information (TV/video)
- Agro-meteorological Station
- Irrigation system (4)
- Green house
- Hydrophonics system
- Roads

iv) Machinery and equipment

- Farm Machinery

- High power tractor
- Medium power tractor
- Small power tractor
- Combine harvester
- Planter/Seeding machine
- Broadcasting machine
- Leveler
- Power sprayer
- Manual and automatic sprayer
- Manure spreader
- Disk plough
- Disk harrow
- Tooth harrow
- Straw chopper
- Grinder
- Pack roller
- Corn picker
- Fertilizer applicator/Urine spreader
- Automizer

- Truck
- Trailer
- Micro-tractor with implements
- Farm work shop equipment
- (Lathe, welding machine etc.)

b) Livestock equipment

- Artificial Insemination Kit
- Mechanical Milk Sucking Machine
- Slaughter house and equipment for swine

c) Laboratory equipment

The following laboratories are planned to be included in the demonstration center

- Soil Laboratory
- Bio-technology laboratory
- Seed laboratory
- Plant Protection Laboratory

d) Vehicles

A more detailed list of equipment shall be prepared during the detailed design stage of the implementation of the demonstration center.

(5) Implementation Agency and Method of Implementation

The Secretariat of Agriculture (SAG) of the State of Tocantins will be main implementation agency of the demonstration program. SAG will carry out the planning and construction of the demonstration farm. At present, there is a Technology Division under SAG in Palmas. This technology division should be strengthened more with the research, technical, training and extension, administrative and laboratory staff. Most of the staff of this division shall be stationed at the Demonstration Center. The total number of staff required for the Demonstration Center is mentioned in the next section. Apart from these main staff, one/two technical staff should also be appointed at the regional offices for the demonstration and extension at the model farms.

SAG shall be assisted by a committee formed by RURALTINS, UNITINS, CECT, RURAL FARMERS AND AGRICULTURAL INDUSTRIES which shall determine the course of action at each stage of implementation of the demonstration program. In regard to the activities of the demonstration farm, SAG will be supported by other organizations such as UNITINS, RURALTINS, EMBRAPA and other related organizations. UNITINS and EMBRAPA will support the research activities of the demonstration program and RURALTINS will support for the training and extension activities of the demonstration program. Since EMBRAPA is the main organization

responsible for the agricultural researches in Brazil, a strong coordination shall be established with EMBRAPA and the researches which were already experimented at the EMBRAPA shall be verified for the conditions of Tocantins. The functions of the committee each member of the committee of demonstration farm are listed below :

1) SAG

- Implementation and management of Demonstration Farm
- Identification of the demand/requirement of the technology for the regions and the state
- Search and Select new technologic innovations
- Transfer of technologies

2) Regional Offices of SAG (With newly appointed staff)

- Demonstration at model farms
- Identification of the demand/requirement of the technology for the region

3) RURALTINS

- Collection of Data and Information on the technology demand/requirement of the state
- Selecting the farmers and training arrangement
- Extension and transfer of technology
- Search for new technologic innovations

4) CECT

- Collection of Data and Information on the technology demand/requirement of the state
- Financial support for the project

5) UNITINS

- Collection of Data and Information on the technology demand/requirement of the state
- Transfer of technology
- Search and select new technologic innovations

6) Committee

- Determination of course of action at each major step
- Assisting SAG in the implementation of various activities of the demonstration farm

7) Coordination with EMBRAPA

- Verification of researches which were already experimented at EMBRAPA
- Formulation of research themes in cooperation with EMBRAPA
- Joint researches with EMBRAPA

(6) Staffing Requirement for the Demonstration Center

As discussed above, the main activities of the demonstration center include experimental cultivation and demonstration farming, training and extension, and environmental monitoring. Research scientists shall be selected in the major fields of Animal Husbandry & Veterinary medicine, Agronomy, Agricultural Engineering, Plant Breeding etc. Since these scientists lay the foundation stone of the development of demonstration center, research scientists and technical officers with high caliber shall be selected and appointed for carrying out these works. Besides, the demonstration center also include many facilities such as laboratory facilities, irrigation facilities, farm machinery etc. and suitable technical staff should also be appointed for these positions. The initial staffing requirement of the demonstration center and their major responsibilities are mentioned below :

Item	Position	No.	Work
1.	Chief Scientist	1	Overall management of all the demonstration, extension and training activities
2.	Research Scientists	6	Research, demonstration and training
3.	Demonstration, Extension and Training Assistants	3	Assisting the research scientists in their activities
4.	Laboratory Technicians	4	Lab work, Collection and Analysis of data
5.	Mechanics	2	Maintenance of farm machinery and equipment and Irrigation equipment
6.	Machinery & Vehicles Operators, Drivers	6	Operation of Farm machinery and vehicles
7.	Administrative Staff	2	Administration, Accounting
8.	Supervisors of Field works	1	Field work / Animal husbandry management
	Total	25	

Apart from these permanent staff, 15 casual laborers (or more/less) shall also be employed depending on the requirement of the demonstration activities at the demonstration center. It should be noted that it is minimum staffing requirement to be start with at the beginning of the demonstration center. Once the demonstration center is established, the number of research scientists and the other supporting staff may be increased more and more depending on the research, and demonstration theme and objectives.

(7) Financial Proposal

1) Initial Investment for Demonstration Center

Required Amount

DESCRIPTION	R$
Land procurement cost, R$400/ha x 800 ha	320,000.00
Main Building (650 m^2)	260,000.00
Dinning Hall (200 m^2)	100,000.00
Dormitories (30 apartments) (900m^2)	360,000.00
Resident Houses (3) - 64 m^2 each	38,400.00
General Store - 300 m^2	60,000.00
Stable - 425 m^2	17,000.00
Installation for poultry 125 m^2	10,000.00
Pigsty - 720m^2	35,000.00
Sheepfold 100 m^2	15,000.00
Green houses (2) 360 m^2	5,200.00
Food industry - 200 m^2	40,000.00
Machinery Maintenance area 100 m^2	20,000.00
Warehouse - 60 m^2	12,000.00
Machinery Shed - 600 m^2	108,000.00
Sub-Total (Construction Cost)	1,080,600.00
Equipment for Kitchen	70,000.00
Silo - 300 ton	20,000.00
Office equipment	50,000.00
Furniture for dormitories	70,000.00
Computers for research	40,000.00
Equipment for training	50,000.00
Cattle Equipment	20,000.00
Fencing	6,000.00
Beehives - 50	7,000.00
Mini-industries (3) (beef/milk/fruits)	60,000.00
Transformer	5,000.00
Pumping Station (4)	12,000.00
Pisciulture tank 1-ha	15,000.00
Well (2)	50,000.00
Rural telephone kit	5,000.00
Parabolic antenna for meteorological information (TV/video)	3,000.00
Arboretum for production of seedlings	10,000.00
Tensiometer	4,000.00
Agro-meteorological Station	20,000.00
Irrigation System (4)	192,000.00
Hydroponian System	8,000.00
Mini-factory for treatment of residues	40,000.00
High power tractor (+120 C.V.) - 2 Nos.	110,000.00

Medium power tractor (+85 C.V.) - 2 Nos.	80,000.00
Small power tractor (70 C.V) - 2 Nos.	60,000.00
Combine Harvester (+140 H.P)	80,000.00
Direct and conventional planter/Seeding machine	22,000.00
Broadcasting machine	5,000.00
Leveler	9,500.00
Sprayer (2)	10,000.00
Manual sprayer (4)	400.00
Automatic sprayer - small	400.00
Atomizer	8,000.00
Manure Spreader	5,000.00
Disk Plough (2)	4,000.00
Disk Harrow (2)	7,000.00
Tooth harrow	1,500.00
Straw chopper	9,500.00
Grinder	1,500.00
Pack Roller	3,500.00
Corn picker	15,000.00
Fertilizer applicator	9,800.00
Truck - 2 Nos.	80,000.00
Trailer - 2 Nos.	4,000.00
Micro-tractor with implements	25,000.00
Farm machinery workshop	100,000.00
Insemination Kit for the Chiva method	7,000.00
Mechanical milk producer	6,000.00
Slaughter house for swine with equipment	60,000.00
Sub-Total (Equipment Cost)	1,481,100.00
Sub-Total (Land Cost, Construction and Equipment Cost)	2,881,700.00
Laboratories i) Soil Laboratory	122,755.00
ii) Bio-technology laboratory	158,891.00
iii) Seed laboratory	185,394.00
v) Plant Protection Laboratory	100,000.00
Sub - Total	567,040.00
Vehicles for Demonstration, Research and Extension	300,000.00
Total	3,748,740.00
Consultancy Cost - approx.7% of the project cost	262,410.00
TOTAL	4,011,150.00

2) Annual Running Cost

The annual running cost shall include the following items :

(i) Administrative Cost (Salaries of staff etc.)
(ii) Demonstration / Experimental cultivation cost
(iii) Training and extension cost
(iv) Machinery and Equipment maintenance cost

An approximate estimation of the annual running cost is given below :

Item	Description	No.	Monthly Expenditure (R$))	Yearly expenditure (R$)
1.	Administrative cost - Salaries Chief Scientist	1	3,000	36,000
2.	Research Scientists	6	2,100	151,200
3.	Demonstration, Extension and Training Assistants	3	600	21,600
4.	Laboratory Technicians	5	600	28,800
5.	Mechanics	2	400	9,600
6.	Machinery & Vehicles Operators, Drivers	6	400	28,800
7.	Administrative Staff	2	350	8,400
8.	Supervisors of Field works	1	350	4,200
9.	Casual laborers	15	300	54,000
	Sub-Total (1 to 9)	50		342,600
10.	Salary of regional staff	10	600	72,000
	Total Salary expenditure	60		414,600
11.	Administrative cost		5,000	60,000
12.	Demonstration cost = 500 /ha x 400 ha			200,000
13.	Training cost (Including travel)		8,000	96,000
14.	Machinery operation & maintenance		10,000	120,000
	Total			890,600

3) Total Project Cost

The Investment Cost for the project can be summarized as follows :

Item	Description	Cost (R$)
(i)	Land procurement cost, R$400/ha x 800 ha	320,000
(ii)	Construction cost	1,080,600
(iii)	Equipment and Machinery cost for the Farm	1,481,100
(iv)	Laboratories Equipment Cost	567,040
(v)	Vehicles Cost	300,000
	Sub - Total	3,748,740
(vi)	Consultancy Cost - approx.7% of the cost	262,410
	Total	4,011,150

Running cost for one year is R$ 890,600. While applying for the project loan to other international agencies, if it is assumed that the running cost for atleast 3 years will be

arranged by the state government, the running cost for the three years period will be R$ 2,671,800.

In this case the total project cost will be R$ 6,682,950, in which the foreign loan part shall be 4,011,150 (approx.60%) and the local part shall be R$2,671,800 (approx. 40%).

4) Method of Fund Raising

If enough funding can be allotted from the State Finance, the State can arrange for the funding from its own finance. Otherwise, the State government shall apply for a loan to the international financing institutions. SAG should also make necessary arrangements to arrange for the fund for the annual running cost of the demonstration program. Although the initial running cost of the demonstration farm need to be borne fully by the SAG, once the demonstration farm starts functioning effectively, the products from the demonstration center can cover the running cost to some extent. Besides, when the training is arranged at the Demonstration center, a fee shall also be charged to cover the expenses of the training and extension program. The demonstration center should also publish its results through various publications and it shall also try to sell its technology by selling its publications.

(8) Method of Implementation and Implementation Schedule of the Program

1) Construction of the Demonstration Farm

The construction works of the pilot farm shall be carried out on a contract basis and the contractors for the construction works shall be selected through competitive tendering to carry out the construction works.

2) Construction Period

All the works including the procurement of land, designing, and construction shall be completed within a period of 24 months.

3) Employment of Consultant Services

Employment of engineering consultant who has rich experience and knowledge on the necessary technical fields is required for the smooth progress of the construction works of the experimental/demonstration farm. The consultant shall be responsible for the works of detailed design, preparation of tenders, and supervision of construction facilities.

4) Implementation Schedule

Implementation schedule until the beginning of the full functioning of the demonstration farm is illustrated as below.

Category	1st year	2nd year	3rd year
Application and Arrangement for Fund			
Procurement of Land			
Consulting services			
Site Survey, and Detailed Design			
Construction of Buildings and shed of the farm			
Procurement of Farm Machinery & Equipment			
Appointment of Staff for Demonstration Farm			
Starting the Demonstration Farming & Training			
Appointment of Staff for Regional SAG Offices			

(9) Benefits of the Demonstration Program

It would be impossible to quantify the direct and indirect benefits of the demonstration program, since the main target or the purpose of the demonstration program to demonstrate the latest technology to the farming community for the sustainable agricultural and livestock production. Some of the major benefits which are attainable through the demonstration program are enumerated below :

- Through the demonstration program, a new agricultural research/demonstration center will be established in the state for the promotion of agricultural research and development

The State of Tocantins is a new state which was established just in 1989 has no specific research organization such as EMBRAPA for carrying the agricultural research works. The demonstration farm will contribute not only for the demonstration works but also will be for the research development of the state.

- Demonstration program facilitates the development of agriculture/livestock sector in the state

By disseminating the new technology to the farming community through training and extension, the agriculture/livestock sector in the state will be developed further which will create new employment opportunities

- Demonstration program promotes Environmental preservation

Through the demonstration program, new technologies such as 'crop-pasture rotation', soil conservation methods etc. will be followed, which will focus on the preservation of environment and control the practices of 'queimadas' (clearing the land by burning).

- Demonstration program also provides direct income

Most of the research organizations mainly concentrate on research activities only which

would have long term indirect benefits and normally there won' t be any direct income. However in an agricultural research and development organization like the demonstration center, the agricultural outputs which will be produced through various research activities can be sold to the market which will provide direct income the center. The demonstration center can also sell its technology through publications and can also charge for its training activities. Besides, the laboratory services and selling of good quality seeds can also provide an additional income. These income from these activities can be used to support for the running cost of the demonstration center.

(10) Technical Cooperation from Other International Agencies

Once the demonstration program starts functioning, SAG can contact other international cooperation agencies to arrange for the technical cooperation for the demonstration program. Through these kind of technical cooperation programs, SAG can invite the international scientists to work in the demonstration program together with the Brazilian scientists, by which it would be possible to disseminate the international technology for the development of the Tocantins State. Besides, through these kind of technical cooperation programs, it also would be possible to bring more international research facilities and equipment which would further strengthen the demonstration program.

5 Implementation of the Program Methodology

5.1 General

Considering the characteristics of the Programs, the methodology implementation was divided into 3 categories, with the respective activities:

PART A; Agricultural Credit
- PART A1; Credit for the Environment Preservation Program
- PART A2; Credit for the Green Village Program

PART B; Supply of Goods and Services
- PART B1; Construction of Buildings
- PART B2; Supply of equipment and machinery
- PART B3; Third Part Service

PART C; Management of the Program

PART represents a credit line that may contribute to improve the environment quality. It shall simultaneously promote the efficient utilization of production forces (farmers) in order to reactivate the state economy.

PART B represents a government action that aims at the introduction of new cultivation technology and monitoring, including basic investments that may bring benefits for the community.

PART C represents the program control, component created to improve the implantation and accompaniment.

The Government shall be the coordinator agent of the activities in the Implementation Program, setting the guidelines to reach a sustainable development, giving some subsidies and technical assistance for the introduction of new agricultural techniques.

The role of the government and the private sector are summarized as follows:

PART	Private	Government
PART A	• Invest in productive activities respecting the environment • Increase the production in a sustainable form • Preserve the Environment reducing the deterioration causes	• Supply favorable Credit lines • Promote the activities by subsided credits system • Direct the credits utilization for the environment preservation
PART B	• Make an appropriate use of the activities • Learn the environment importance • Preserve and recover the natural resources	• Offer infrastructure to the diffusion of adequate technologies • Control the harmful actions for the environment
PART C	• Make suitable use of credit lines	• Make a proper and efficient use of the economical resources

(1) Importance of the Agricultural Credit Implementation

The number of agricultural properties in the State of Tocantins, including all size farmers is about 47,000. The main financier agents are the Banco da Amazônia and the Banco do Brasil that annually execute approximately 3,000 operations for the rural sector. This number represents only 6%, when compared to the quantity of owners (47,000), fact that demonstrates that the access to the rural credit are extremely hard for the majority of farmers.

The state agriculture properties can be divided in three groups: the large farms that mainly develop extensive cattle breeding; the medium farms that manage, as enterprise, irrigated rice and other recently cultivated crops (irrigated rice of the Javaés Projects and PRODECER III); and, finally, the small farms group that, even as land owners, basically they practice the subsistence agriculture through the slash and burn system.

The financing, specially that supplied by BASA (like FNO), are mainly destined for large cattle farmer with high credibility (estimated by the banks), however the medium farmers, that represent a small part of the total, have restrict access to special lines credit such as PRODECER, remaining few access possibility to credits for small farmers. The difficulties reasons faced by small farmers are the following:

1. There is a high illiteracy rate among small farmers, besides the irregular land possession situation. These fact make difficult the credit access.
2. Most of them does not have enough guarantee (130% of the requested credit) for their real necessities, decreasing their credibility.

The regional units of RURALTINS provide technical assistance and guidance to small farmers in order to improve this situation, but it is facing difficulties due the lack of servers. In parallel, the federal government introduced a financing system destined to small farmers, the PRONAF, however, the resources amount is small and the utilization rate is very low.

Presently, the agricultural sector of the State is facing the following problems regarding to the production and environment:

1. In the cattle rising sector, one of the state main activities, the large cattle farmers that used to manage their business easily, is now becoming worried about the crisis caused by the reduction of prices. Besides, it is necessary to be reconsidered the burning activities, normally used for the improvement of pastures but pointed as one of the main responsible for the environment pollution.
2. In case of small farmers who produce only for subsistence through extensive burning systems, are hardly interested in the productivity improvement. This system has a tendency to decrease the productivity because of the soils deterioration, besides other environmental problems arisen.

The following measures shall be taken to provide solution of these problems:

1. Production of cereal introducing the rotation of plantation/cattle raising system
2. The introduction of the agriculture production tends to increase the income and labor due to the intensive use of lands. The introduction of the rotation system improves the soil conditions, making possible the productivity increase and rational utilization of agricultural fertilizes.
3. Cereals production makes feasible, besides the exportation, the introduction of milk cattle rising or medium/small size animals, diversifying the cattle rising activities, using the sub-products and excess of the agriculture production for animal ration. So, the farmers may increase their income raising milk cattle, swine or chicken, besides contributing for the development of agricultural industry such as cheese, bacon, etc., providing more employment opportunity.
4. The agriculture/cattle rotation shall be adopted not only by large farmers but also by medium and small farmers. The present situation of subsistence of small farmers can be improved through this system and shall also avoid the problems caused by burning activities.

Summarizing, this system is considered as a way to establish a sustainable agriculture through the preservation of environment, showing the way to develop properly the state agricultural sector, including the products processing industries.

During the field survey carried out in the State North Region, the majority of farmers were highly interested in the development of the system mentioned above (item 3), but conditioned to the supply of technical assistance because they shall be working in unknown activities and also the availability of financing for necessary equipment acquisition with reduced charges.

Regarding to the mechanization, excepting the large farmers who can purchase machinery individually, the small farmers may be organized in associations for the common utilization and acquisition of the machinery.

The special financing destined to small farmers, such as PRONAF, are characterized as social credits with a limit up to R$ 75.000 even for associations, having reduced resources.

As mentioned in item 1, considering that the majority of farmers have difficulties to access the available rural credits, it is necessary the introduction of new resources and new credit lines to cover the crescent demand.

The technical development and its promotion are necessary for new resources acquisition, besides an adequate intervention of public organs in order to adapt and apply these resources according to the correct reality and needs.

Therefore, the state must do priority to these measures as the more important policy to carry out the development of the state economy and the environment preservation,

trying to promote until the limit permitted by the state finances, and even promoting the reviewing of public investments. The state intervention shall never increase the financial cost.

5.2 Implementation Strategy

The program tries to strength the environment control actions and improvement of rural production and productivity conditions. The results foreseen to be reached through the implementation of activities are as follows:

Direct Results	
General	• Procurement of Cheaper External Resources and Low Compromising of the State Resources
Public Investments	• Improvement of the Infrastructures destined to Environmental Education, Monitoring System and Demonstrative Fields.
Credit Lines	• Improvement of the Environment Conditions (reduction of burned and deforested areas and also the reduction of problems caused by agriculture defensive, etc.) • Increase of the forest area • Capitalization of farmers through profitable credit lines • Increase of Agricultural Production • Increase of possibilities for the new technologies introduction aiming the sustainable agriculture.

The basic strategy of the program is to take advantage of the private sector energy, promoting investments, in order to minimize the expenses of the State, completing the necessary actions to reach a sustainable development through the investment of the public sector.

The capital resources (60% of the Required Capital) shall be obtained from foreign sources, as an environmental project, with favorable conditions trying to find a better way to apply the resources in economical and environmental terms and to avoid one more responsibility of the state.

Favorable credits to farmers shall be supplied considering that the basic strategy of the credit is to take advantage of the farmers energy in order to provide an active participation in the growing of production which shall be develop as follow:

1. Obtain a low cost resource
2. Subside the cost referred to the difference of rates, transforming them in cost for the government.
3. The exchange risk shall be assumed by the state in order to reduce the interest rate to be applied, reducing the bank charge, making possible the negotiation of this item. (The exchange risk appear after the end of grace period, meaning 7 years of delay, if there is valorization of the source currency during the amortization period).
4. To formulate an efficient credit system, that not increase the financing cost.

5.3 Procedures for the General Program Implantation

The procedures to obtain the foreign financing are as follows:

1. Requirements of Foreign Credit
2. Evaluation of the Program by the Creditor
3. Contract of the Program (between the Creditor and the State Government)
4. Selection of the Consulting in the Program Management
5. Start of the Program elaboration (Application Methodology for the agriculture Credit and Public Investment)
6. Beginning of the Public Investments Activities (continue in item 4)
7. Beginning of the Agricultural Credit Activities (continue in item 5)
8. Disbursement of the Activities
9. Amortization by Borrowers
10. Amortization to the Creditor by the State Government

Each Part is composed of the following actions:

PART	Contents
PART A	Financing for Farmers
PART A1 (Preservation of Environment)	1. Control of Fire
	2. Support to Extractivism
	3. Reforesting and Foresting
	4. Forest Managing
	5. Recovering of Degraded Areas
	6. Agriculture and Forest System
PART A2 (Green Village)	7. Environment Recovering of the Deteriorated Areas
	8. Sustainable Agriculture
	9. Improvement of the Seeds and Seedlings distribution systems
PART B	Supply of Good and Services
PART B1 (Construction of Buildings)	1. Environmental Education Center
	2. Agriculture-Ecology Center
	3. Central Laboratory for Monitoring
	4. Agriculture-meteorological Stations
	5. Demonstrative Field
PART B2 (Equipment Supply)	6. Environmental Education
	7. Educational Center
	8. Agricultural-Ecology
	9. Monitoring of Fire
	10. Central Laboratory for Monitoring
	11. Agriculture-meteorological Stations
	12. Water Resources and Soil
	13. Demonstrative Field
PART B3 (Third Services)	14. Environmental Education
PART B4 (Actions of the Government)	15. Environmental Education
	16. Educational Center
	17. Agricultural-Ecology
	18. Monitoring of Fire
	19. Central Laboratory for Monitory
	20. Agriculture-meteorological Stations
	21. Water Resources and Soil
	22. Demonstrative Field
PART C	Program Management
PART C1 (Program Management)	Program Management

5.4 Procedures for the Public Investments Implantation

Considering the characteristics of each action, the public investments shall be implemented as follows:

Activity and Procedures

Activity	Procedures
Buildings Construction	• Establish the Buildings Dimensions • Procedures to Contract the Projects Elaboration • Project Elaboration • Procedures to Contract the Constructions • Construction
Equipment and Furniture Supply	• Equipment Qualitative/ Specification • Elaboration of Tender Documents • Procedures to Contract the Provider • Purchase of Equipment
Third Services	• Establishment of the Scope of Services • Procedures for the Rendered Service Selection • Procedures for Hiring of Rendered Service • Actions Implementation

5.5 Methodology for the Agricultural Credit Implementation

The cooperation of institutions such as RURALTINS, SAG, research institutes (EMBRAPA, UNITINS) and the NGOs shall be necessary to implement a credit system that may introduce new technology considering the lack of experience of farmers. The investment models shall be implanted with the support of corresponding institutes in order to reach a higher effect of the implanted program, them the results shall be promoted to obtain future financing. The investments related to the improvement of the rural farmers conditions may have special attention. The investments of the public sector shall be implanted through public tenders, including the environmental education. The program expects the joint actions of the public and private sector, where each of them may have specific responsibility.

Public Sector

- Supply basic infrastructure conditions (electrification, roads, education, health, etc.)
- Make easy the provision of foreign and domestic resources for the execution of the projects
- Strength the execution of programmed activities, even "subsidizing part of the financing charges"
- Provide suitable conditions to the technical assistance organs in order to supply the necessary support requested by the beneficiaries.

Private Sector - Beneficiaries

- Demonstrate interest for new technologies
- Execute the activities according to the requirements of the projects
- Supply the information required during the period of the project

- Promote the program and good results divulging
- Reimburse the received capital and corresponding charges within the schedule and according to the agreement signed with the financial agent
- Contribute for the suitable development of activities
- Make easy the access of technicians and farmers for following of the works
- Create guarantee funds to obtain lower risk rate

- Financial Agent
- Be agile in the stages of analysis and liberation of financial resources
- Facilitate the credit access in a not bureaucratic form
- Take the guarantee fund, operating with lower risk rate

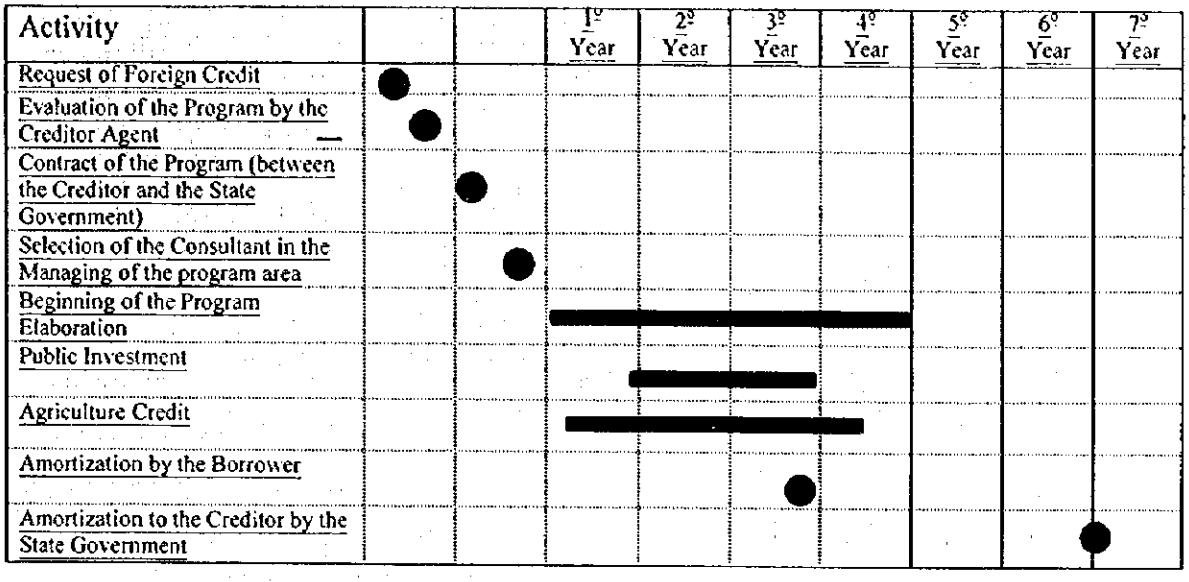
The "CMDR - Municipal Commission of Rural Development" shall be created to implement the credit more efficiently and advantageous aiming the agricultural projects, which will have the following attributions:

- Collect, issue and certify the demand of farmers or organizations regarding social item.
- Increase the agricultural production/productivity and generation of employment and incomes in the rural mean.
- Participate in the production decisions, preservation of environments and organization of rural farmers.
- Promote the coordination and compatible actions among the municipal, state and federal policies for rural development
- Follow, evaluate and divulge the works developed by programs and projects

This commission is composed of:
- president, vice-president and advisors, which number depends on each municipality and on the involved organizations
- the members shall be composed by representatives of public and private sectors and the remaining half members shall be formed by farmers
- In the municipalities where there is office of government organs directly concerned with the agricultural sector (SAG, RURALTINS, NATURATINS, UNITINS), they shall participate in the council.
- a substitute of each member may exist, but must be an integer of the same institution.

6 Implementation Schedule

The program shall be implemented within the period of 4 years, after the financial resources disposability and beginning of the execution as the following time schedule:



7 Program Cost

The program cost is summarized as follows:

7.1 Financing (Private Investment)

The Cost of the Financing Program is composed by:

- Value of Financing (90% of the Value required by the farmers)
- Value of the farmers capital (10% of the Value required by the farmers)
- Government Subsidy for Financing (2,5 % of the Financing Value During the borrower amortization)
- Responsibility of the Exchange Risk (5% of the Foreign Resource)
- Administrative Expenses
- Technical Assistance Expenses (5% of the total Financing Value)
- Others Financing Expenses (estimated as 1% of the Foreign Source Value)

The amount required for this financing is:

Sub-Program	Required Amount (in R$1.000)
ENVIRONMENT PRESERVATION	
1) Control of fire	10.000
2) Forest Managing	30.000
Sub-Total	40.000
GREEN VILLAGE	
1. Environmental Recovering	30.000
2. Promotion of Sustainable Agriculture	60.000
3. Improvement of the Seeds and Seedling Distributions	10.000

Sub-Total	100.000
TOTAL	140.000
a. Financing	126.000
b. Farmer	14.000
c. Subsidy of Interest (2,5% during 10 years)	25.200
d. Exchange Risk Responsibility (5% of the value)	7.000
e. Administrative Expenses (10% of the Required Capital)	14.000
f. Technical Assistance Expenses(15% of the Required Capital)	14.000
g. Others Financial Expenses (1% of the Required Capital)	7.000
TOTAL	207.200
Foreign Portion	126.000
Local Portion	81.200

7.2 Public Investment

The cost of the Public Investments are:

SUB-PROGRAM	Required Capital (R$1.000)	Foreign Portion	Local Portion
CONSTRUCTION OF BUILDING			
1. Environment Educational Center	500	500	
2. Agricultural-Ecology Center	250	250	
3. Central Monitoring Center	300	300	
4. Agrometeorological Stations	400	400	
5. Demonstrative Field	1.400	1.100	300
Sub-Total	2.850	2.550	300
EQUIPMENT SUPPLY			
1. Environmental Education	500	500	
2. Educational Center	1.100	1.100	
3. Agricultural-Ecology Center	650	650	
4. Fire Monitoring	1.300	1.300	
5. Central Laboratory for Monitory	1.500	1.500	
6. Agrometeorology	1.700	1.700	
7. Water Resources	1.500	1.500	
8. Demonstrative Fields	2.400	2.400	
Sub-Total	10.650	10.650	0
THIRD SERVICES			
1. Environmental Education	700	700	
Sub-Total	700	700	0
ACTIONS OF THE GOVERNMENT			
1. Environmental Education	900		900
2. Environmental Education Center	900		900
3. Agroecologic Center	300		300
4. Monitory of Fire	1.000		1.000
5. Central Laboratory for Monitory	600		600
6. Agrometeorology	1.200		1.200
7. Water Resources	1.500		1.500

	0		0
8. Demonstrative Fields	3.000		3.000
Sub-Total	9.400	0	9.400
SUB-TOTAL	23.600	13.900	9.700

(3) Cost of the Program

The cost of the program is estimated as follows:

PROGRAM	Required Amount (R$1.000)	Foreign Portion	Local Portion
PART			
1. PART A (CREDIT)	207.20 0	126.00 0	81.200
2. PART B (Supply of Goods)	23.600	13.900	9.700
3. Sub-Total	230.80 0	139.90 0	90.900
4. PART C (4% do Item 3)	9.200	5.600	3.600
5. TOTAL	240.000	145.500	94.500

8 Methodology for the Resources Investment (Flow Chart of Capital, etc.)

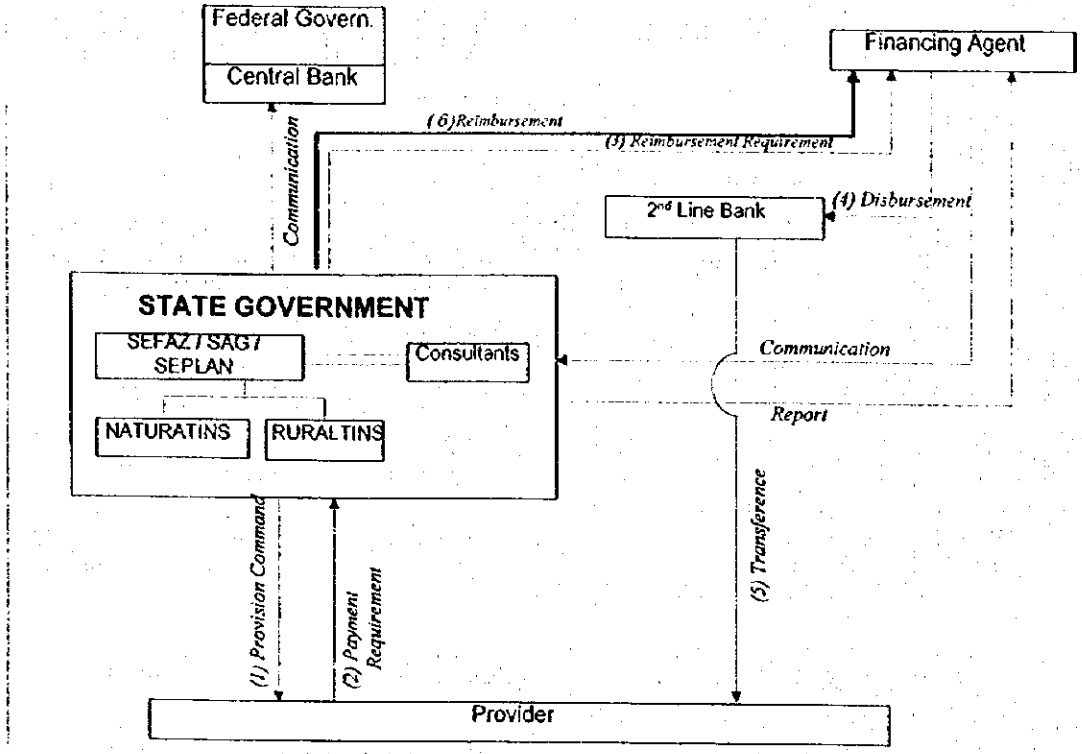
The Program shall be implemented according to the characteristic of each activity. The programs were divided as follows:

Type of Investment	Sub-Program
Public Investment;	• Environmental Education
	• Environment Monitory System
	• Demonstrative Field
Private Investment;	• Sustainable Forest Monitory
	• Control of Fire
	• Improvement of the Rural Environment
	• Distribution of Seeds, Seedlings and Semen
	• Sustainable Agriculture

8.1 Public Investment

The action of the public sector shall be directly implemented by the corresponding organs, analyzing the investment needs and costs, utilizing foreign investments. The State government will participate by utilization of the existing human resources, construction of necessary installations, etc., in the actions pertinent to each organ, without significant increase of the state budgets.

(Public Investment)



8.2 Private Investment

The private investments shall be promoted through the agricultural credit. Five main actions lines shall be developed around the Credit for Preservation of Environment.

1. Credit for the Forest Management Activities
2. Credit for the Fire Control
3. Credit for the Improvement of Rural Condition (mini and small farmers)
4. Credit for distribution of Seeds, Seedlings and semen
5. Credit for Sustainable Agriculture

- Private Sector Investment

The investments of the private sector are promoted through the introduction of credit lines for farmers. These credit shall be implemented through favorable conditions for the investors in order to promote the development. It is necessary to create different credit lines in relation to the already existing in order to create advantages compared to other States and stimulate investments in the areas related to environment in order to reach new investors (from the State or other States). Promotion of new investments in terms of areas and cultivation technologies shall be reach through this strategy.

Financing for farmers are applied in fix and semi-fix investment, using the investments coming from Foreign Sources (approximately 90% of the required capital) and the resources supplied by the farmers (10% approximately), creating a rotary fund. The

small farmers who do not have this 10%, may participate supplying man power cost, etc.

- Methodology for Resources Investment

Rotary Fund shall be created to continue de credit which may operate with compensated resources. The Rotary Fund is a financial instrument used to promote the state social-economy development, aiming the preservation of natural resources, expansion of agriculture frontiers and increasing of productivity index through the introduction of new technologies.

The support and stimulation of farmers, their cooperatives and associations shall be a priority in order to reach the objectives foreseen.

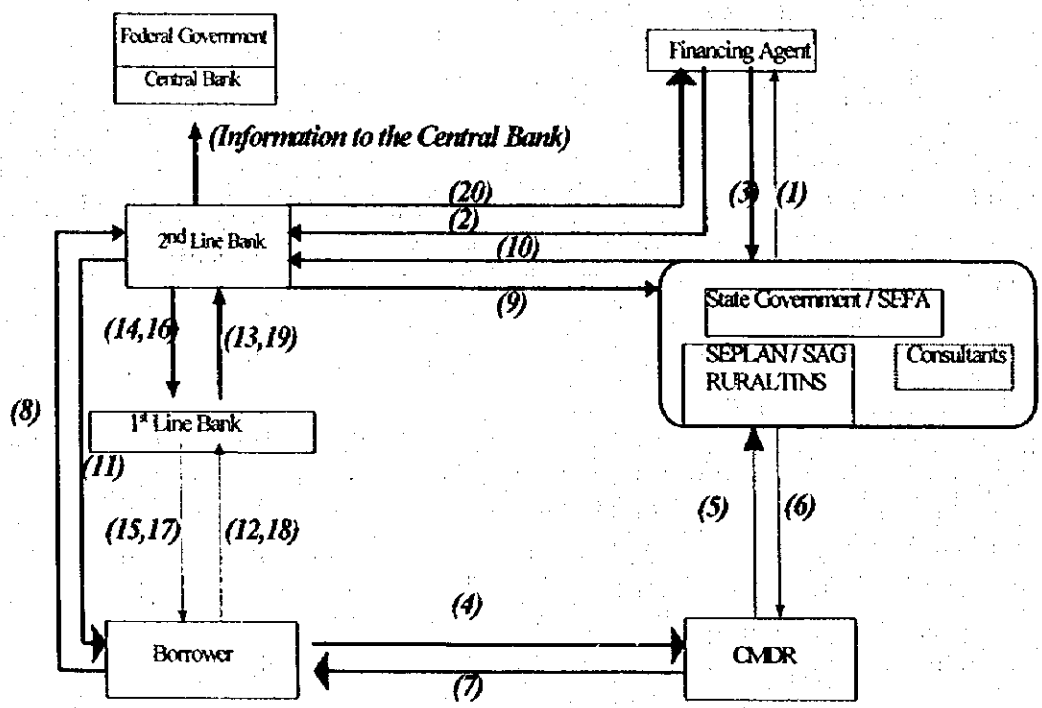
The rotary fund shall also transfer to the State Treasury, resources for payment of charges and amortization of local-foreign credit operations, to be contracted by the State and originally destined to the Fund, according to the disbursement schedule to be established by the State Finance Secretary with the enforcement of the rules and conditions for the credit effectively agreed.

- Participation of Several Agents in the Implementation of Rural Credit

The participation of the State Government (more than 30% of the required investment) shall be to assume certain financial costs (i.e. exchange risk), subsidy to farmers (differences between the interest rate that may be applied by the banks, without losses and the rate to be applied), the cost of technical assistance to implement the new credit system, etc. Ten percent (10%) of the required capital shall be proposed to be provide by borrowers in order to complete the participation (40% of the required investment).

The credit lines existing in the Federal Government shall be invested for the financing of the annual production cost, once they are considered favorable.

[Agricult. Credit]



1. Disbursement Requirement
2. Disbursement
3. Disbursement Communication
4. Requirement for Project Approval
5. Communication of Project Contents for SAG Analysis
6. Information about Analysis Results
7. Communication of Results
8. Requirement of Contract
9. Requirement for Contract Analysis
10. Communication of Contract Analysis Results
11. Contract
12. Credit Requirement
13. Transference Requirement
14. Transference of Funds
15. Credit to the Borrower
16. Requirement of Recuperation
17. Requirement of Payment
18. Payment
19. Transference of Payment
20. Reimbursement to the Financing Agent

Remark: Only the approved projects will follow the procedures.

9 Financing Schedule

The Financing Schedule of the Program is presented as follows:

	PARTE A			PARTE B		PARTE C		TOTAL		
Ano	Finan.	Gov.	Prod.	Finan.	Gov.	Finan.	Gov.	Finan.	Gov.	Prod.
1								0	0	0
2	31,500	11,200	3,500			2,000	1,400	33,500	12,600	3,500
3	37,800	14,300	4,200	7,000	5,000	1,500	900	46,300	20,200	4,200
4	37,800	15,200	4,200	6,900	4,700	1,000	900	45,700	20,800	4,200
5	18,900	8,400	2,100			1,100	400	20,000	8,800	2,100
6		3,000	4,500					0	3,000	4,500
7		2,700	9,900					0	2,700	9,900
8		2,700	15,300		800		400	0	3,900	15,300
9		2,300	18,000		800		400	0	3,500	18,000
10		1,800	18,000		800		300	0	2,900	18,000
11		1,400	18,000		800		300	0	2,500	18,000
12		900	18,000		800		300	0	2,000	18,000
13		600	13,500		800		300	0	1,700	13,500
14		400	8,100		800		300	0	1,500	8,100
15		300	2,700		800		300	0	1,400	2,700
16		300			800		300	0	1,400	0
17		300			800		300	0	1,400	0
18		300			800		300	0	1,400	0
19		300			800		300	0	1,400	0
20		300			800		300	0	1,400	0
21		300			700		300	0	1,300	0
22		300			700		300	0	1,300	0
23		300			700		300	0	1,300	0
24		300			700		300	0	1,300	0
25		300			700		300	0	1,300	0
Total	126,000	68,200	140,000	13,900	23,600	5,600	9,200	145,500	101,000	140,000