IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Harvesting And Mathematical Analysis Of Plant Models In Ecology

Tailam venkata gayatri

Assistant Professor

SIR CR REDDY COLLEGE OF PHARMACEUTICAL SCIENCES , ELURU

ABSTRACT

A nursery is an agriculture where plants are propagated, nurtured, grown, and sold out to the home garden or commercial purpose. Two important factors determined the nursery design was nursery physical environmental factors and the technical factors of seedling production. In this project we mainly study two important factors determined by the nursery design, one is nursery physical environmental factors and another one is technical factors of seedling production so the purpose of this project is to systematically review the applications and methodology of statistics to calculate the estimation of cost production by using statistics methods. Variance cost method is used for gather data, Least square method is used to calculate the cost estimation.

INTRODUCTION

1.1: Overview of Statistics

Production of agriculture economic performance indicator is a key instrument in economic analysis and a fundamental requirement for effective policy making. Among these indicators, calculating the cost of production has historically been one of the most useful of those indicators. Providing users with access to complete and comprehensive production costs allows all stakeholders with information that will contribute to making markets more efficiently.

This publication presents recommendations for designing and implementing a program of cost of production estimation 1 for countries. It takes into account the academic literature which defines the cost of production concepts and the experience from statistical agencies that have an ongoing cost of production program. It acknowledges that not all statistical agencies have the same endowments with respect to its statistical infrastructure and that the target universe varies greatly across countries and makes challenges unique for all countries. Nevertheless, these guidelines serve as a useful reference tool for agriculture statistics to build a program for estimating commodity cost of production and for analysis to understand the basics for the estimates.

Introduction of Statistics

Statistics is a branch of mathematics that deals with the study of various techniques used for the collection, organization, analysis and interpretation of data. After the interpretation of data, a final report is written that is comprised of data, results and final decisions.
We are using least squares method using straight line for estimating the cost value.
Let y=a+bx ----------1be a straight line for given data of 'n' pairs if observations

$$(X_1, Y_1), (X_2, Y_2) \ldots\ldots\ldots\ldots (X_n, Y_n)$$

Now find the problem is best fit of straight line by using principle of least squares . Residual sum of squares of y is

$$E = \sum [Y_i - (a + bX_i)]^2$$

We have to minimize E for the best possible values of a and b .By using principle of maxima and minima , equating the partial derivatives of E with respect to a and b to zero,

We get

$$=> 2[Y_i - (a + bx_i)](-1) = 0$$

$$=> \sum Y_i - na - b \sum X_i = 0$$

$$=> \sum Y_i = na + b \sum X_i \text{----------2}$$

=>2[yi-(a+bx_i)]+(-x_i)=0

$$=> \sum x_i y_i - a \sum x_i - b \sum x_i^2 = 0$$

$$=> \sum x_i y_i = a \sum \boldsymbol{x_i} + b \sum x_i^2 \text{----------3}$$

equation 2 and 3 are called normal equations to obtain estimated values of 'a' and'b' . The value$\sum \boldsymbol{x_i} \sum x_i^2 2 \sum \boldsymbol{x_i} y_i$scan be obtained from the given set of observations . With these values of a and b , equation 1 is the beststraight line of the given data.

mathematical reasoning suggests that, to obtain the values suggests that , to obtain the values of constants a and b according to the principle of least squares

, we have to solve simultaneously the following two equations.

$$\sum y = na + b \sum y$$

$$\sum xy = a \sum x + b \sum x^2$$

Solution of the two normal equations yield the values for the constants a and b.

Variance Cost:

Variable cost was a cost spent by the nursery unit and the amount was determined on the output/productivity/production volume. The costs were money spent for buying the pollybag, fertilizer, fee of media mixing and filling the polybag.

The total cost formula is used to derive the combined variable and fixed costs of a batch of goods or services. The formula is the average fixed cost per unit plus the average variable cost per unit, multiplied by the number of units.

The formula is:

(Average fixed cost + Average variable cost)×number of units = Total cost

For example, a company is incurring 10000 of fixed costs to produce 1000 units (for an average fixed cost per unit of 10), and its variable cost per unit 3. At the 1000-Type equation here.unit production level, the total cost of the production is:

(10 Average fixed cost + 3 Average variable cost)×1000 Units = 13000 Total cost

1.2: Introduction to Nursery

A nursery is a agriculture where plants are propagated, nurtured, grown, and sold out to the home garden or commercial purpose. Under favorable conditions, improved quality seedlings are grown until they are prepared for planting on small scale or big scale. Young plants which are propagated in nurseries can be sold in retail nurseries or a wholesale nurseries. The sole purpose of all nurseries is to provide young plants or saplings to gardens, farms, agriculture, forest, and for conservation. A nursery plant center offers its customers all types of young plants that are local (native), imported and exotic. A nursery customer could be a home gardener, landscape gardener, or even a commercial farmer. A nursery business must cater to a wide range of plants that will be indoor to outdoor plants and container to earth planting plants. Nurseries must be equipped all kinds of horticulture requirements such as all sorts of plants seeds, soil mix, fertilizers, insecticides, garden chemicals, garden tools, and be able to answer backyard inquiries. Apart from plants, the nurseries have to have the ability to assists in all kinds of inquiries and purchases.

Nurseries can be started irrespective of where you're located but with sufficient land space to grow plants. Nursery business can be initiated from the backyard, in open plots, in greenhouses, or in agriculture lands. To begin business one must have a clear understanding of what kind of plant species to develop. Usually, nurseries that are located in urban regions could prefer growing flowering plants, decorative plants, vegetable plants and ornamental trees. You have to identify the market need and accordingly must disperse plants in the nurseries.

THE NURSERYDESIGN

The principle used in a nursery design is the success of high quality seeding production. There are two main elements determining the successful seeding production, i.e, the environmental factors and seeding production techniques in nursery operation as illustrated in figure1.

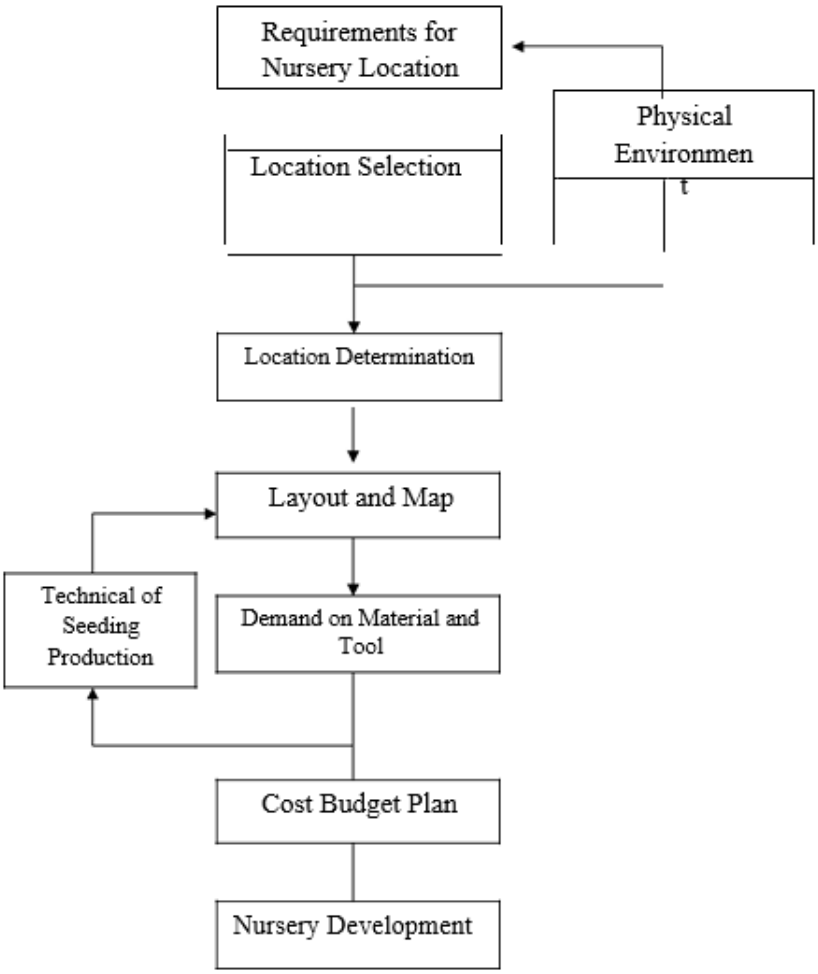

Figure 1. The making process of nursery design Figure 1 shows that the physical environmental factors, which give influence to the successful seeding production, are (i) availability of water resources, (ii)topography, (iii) climate, (iv)accessibility, (v) community's housing, (vi) electricity, (vii) communication and (viii) the nursery layout. Meanwhile, the seeding production techniques that have closely related to the successful production are the size and species of seed that would be sowed, seed treatment, light demanding seedlings, seedling maintenance (weeding, fertilizing, post and disease control, and watering in replacement beds) and the selection of ready to plant seedlings.

2.1: Nursery LandArea

The nursery area is determined by the number of seeding to be produced. Generally, the nursery land is divided into two big parts; one part for production process and another part for itfacilities. Land for production process, which consists of land for houses, greenhouse or bud cutting container and replacement beds take 60% of land total area. The rest o f 40% is used for the facilities, such as road, working based and other building.

Land total area = production land area + facilities land area

Production land area = 100/60×number of seedling production0.01m2

facilities land area = 100/60×production land area ×40/100

- 0.01m2 is a pollybag size with 10cm of its diameter (pollybag flat area is 100cm2) for one seedling planting media

For example, if 1 million seedlings are going to be produced, the required land is: Production land area = 100/60× number of seedling that would be produced

= 100/60×1.000.000

= 16,667m2

= 1.67 Ha

Facilities Land Area = 100/60 × 1.67 × 40/100

= 1.11 Ha

The required land area = 2.78 Ha

2.2: The Required Nursery Materials andTools

Based on the design map, the required tools and materials in establishing the nursery are inventoried, for instance the greenhouse establishment(size and shape), replacement beds (quantity, capacity and height)for watering (number of watering points, watering area and length of watering house) and warehouse for placing the nursery materials (fertilizers, pollybag, seeds and shading net) and tools (hand sprayer and hoe).

Arranging the budget plan

The budget for nursery establishment was arranged based on its conducted activity and analysis on inventory result of required tools and materials. The analyzed budget components covered:

(1) The land preparation

(2) Building establishment

(3) The establishment of irrigation system

(4) Machines and tools procurement

(5) Cost of fuel, package, media, fertilizer, fee for worker and seedling maintaining.

Land Preparation

The land preparation was conducted through land clearing, land leveling and terrace making, soil solidifying to make easy the replacement house making.

The Production Process of High Quality Seeding

Filling the pollybag

Seedling replacement

The seedling cleaning

Fertilizing

Watering

Seeding Selection

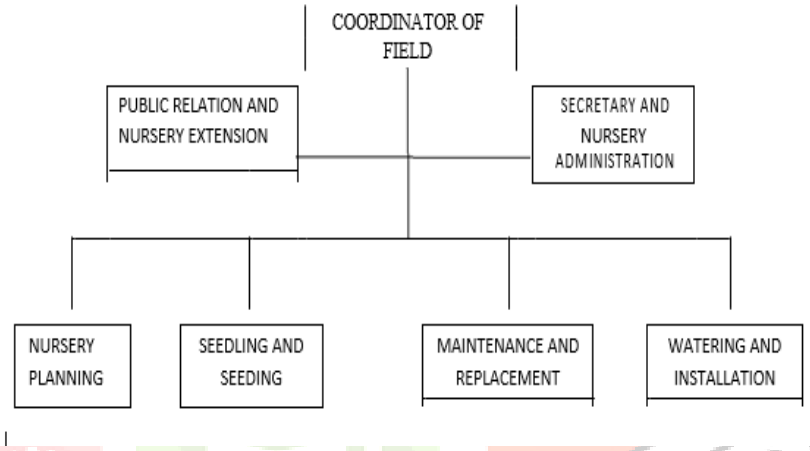

Figure : Organization structure of nursery management

Valuable lessons from a seedling production trial process

In trial seedling production process, there were several valuable lessons to be considered for running the next seedling production smoothly and for preventing the mistakes during the trial process. It was expected to be is more effective and efficient production in the future.

CALCULATION ON THE NURSERY PRODUCTION COST

The establishment of permanent nursery has been completed in 2.5 ha land area with 1.2-1.6 million seedlings from 6 selected tree species as its production capacity. The nursery operation was trying out with producing of 1.27 million seedlings.

Realizing and learning from the experiences of another projects, the establishment of nursery facilities was often neglected after the project ending so that the nursery sustainability should be properly planned at least for the next 10 years operation.

One of the efforts in anticipating the sustainability of nursery was the review on the seedling production cost per plant species to know the required budget of project operation. Therefore, the calculation on seedling production cost was highly required by considering all expenses during the establishment and operational of the nursery. The objectives of calculation on the seedling production cost are:

(1) To identify the expenses during the nursery operational

(2) To calculate the break event point of each plant species and the production cost of each seedling

(3) To find out the alternative of financing sources and nursery management

4.1: Identification of Cost Components on Seedling Production

The required cost on seedling production in the in nursery covered the fixed and variable costs. It is classified based on the direct and indirect cost related to the seedling production.

Estimation of cost:

Types of Cost Estimates As mentioned in chapter 1.1 the cots and estimating methodology in this Manual are directed toward the "study" estimate with a probable error of 30%. According to Perry's Chemical Engineer's Handbook, a study estimate is "… used to estimate the economic feasibility of a project before expending significant funds for piloting, marketing, land surveys, and acquisition… it can be prepared at relatively low cost with minimum data." The accuracy of the study-level estimate is consistent with that for a Class 4 cost estimate as defined by the Association for Advancement of Cost Engineering International(AACEI) which AACEI defines as a study or feasibility – level estimate. Specifically, to develop a study estimate, the following must be known.

1. Location of the plant
2. Location of the source within the plant
3. Design parameters, such as source size or capacity rating, uncontrolled pollutant
4. concentrations, pollutant removal requirements etc
5. Rough sketch of the process flow sheet(the relative locations of the equipment in the system)
6. Preliminary sizes of, and material specifications for, the system equipment items
7. Approximate sizes and types of construction of any buildings required to house the control system
8. Rough estimates of utility requirements(e.g, electricity, steam, water, and waste disposal);
9. Quantity and cost materials consumed in the process(e.g., water, reagents, and catalyst);
10. Preliminary flow sheet and specifications for ducts and piping; Approximate sizes of motors required

Indirect, or "fixed" annual costs are independent of the level of production (or whatever unit of measure serves as the analytical metric) and, in fact, would be incurred even if the control system were shutdown. Indirect costs include such categories as administrative charges, property taxes, insurance, administrative charges including permitting costs and capital cost amortized into capital recovery. Capital is depreciable, indicating that, as the capital is used, it wears out and that lost value cannot be recovered. Economic depreciation, which is the lost value that is usually used in a cost analysis. Depreciation costs are a variable or semi-variable cost that is also included in the calculation of tax credits and depreciation allowances whenever taxes are considered in a cost analysis. However, taxes are not uniformly applied, and subsidies, tax moratoriums, and differed tax opportunities distort how the direct application of a tax works.

Finally, direct and indirect annual costs can be offset by recovery credits taken for materials or energy recovered by the control system, which may be sold, recycled to the process, or reused elsewhere at the site. An example of such credits is the by-product of controlling sulfur with a FGD scrubber. As the lime or limestone reagent reacts with the sulferin the exhaust gas stream, it becomes transformed into CaSO4 – gypsum – which can be land filled expensively (a direct cost) or collected and sold to wallboard manufacturers (a recovery credit). These credits, variable cost was a cost spent by the nursery unit and the amount was determined on the output/productivity/production volume. The amortization

cost should be eliminated , budget (no obligation to return the investment) so that price of seedlings production must be lower and more profitable if the seedlings were sold to the external buyers .

To collect the first year of the investment and five years of nursery cost of the data and with variance of necessary blocks of the five years cost of the data and total cost for estimating the total cost of data by using least squares of y for estimating the values cost .

Particulars	**Quantity**	**Rate/unit**	**Investment**	**2015**	**2016**	**2017**	**2018**	**2019**
Fencing	400 sq.m	600	240000	-	-	-	-	-
Work shop	20 sq.m	1100	22000	-	-	-	-	-
Mother plant block	6000sq.m	5	30000	9000	6000	5000	9000	9000
Irrigation with pipeline	10000sq.m	13.5	135000	5000	4000	3000	5000	5000
Office cum store	25 sq.m	1100	27500	-	-	-	-	-
Shade net house	400 sq.m	350	140000	-	-	-	-	-
Poly house	200 sq.m	600	120000	-	-	-	-	-
Poly tunnel	100 sq.m	300	30000	-	-	-	-	-
Preparation of land, nursery, beds, internal roads, pathways	2000 sq.m	20	40000	-	-	-	-	-
Water storage	1 unit	125000	125000	-	-	-	-	-
Nursery tools	Required	-	15000	-	-	-	-	-
Root trainers, pots	10000 no	3	30000	-	-	-	-	-
Propagation kit	Required	-	3500	-	-	-	-	-
Electricity/generator	1 unit	27000	20000	-	-	-	-	-
Total			978000	14000	9000	8000	14000	14000

Particulars	Quantity and rate	Cost of return
Sale of seedlings	5000 no's 5rs each	250000
Sale of grafts/cuttings	15000 no's, 15rs each	225000
Total		475000

Table showed that the highest variable costs in seedling production were used for media filling cost(20.9%), compost media procurement(20.9%), pollybag procurement(17.3%) and seedling maintenance (16.0%). Meanwhile the lowest variable costs were to buy chemical fertilizer (NPK), pesticide and fungicide.

4.2: The Estimation of cost production:

cost estimation is very difficult to do accurately, but it is very important for us to understand the relative impact of design and production decisions on overall cost and manufacturability. To this end, we recommend reporting both your estimate of the total number and duration of manufacturing and assembly operations, and your estimate of the total production costs.

The recommended process for production for cost estimation is to sum the purchased materials and components cost with an additional cost based on labor cost but modified to account for overhead, eccupment cost(based on the level of worker skill required), and tolerance levels specified.

And we are calculate 5years of data for estimation of cost excepting starting year of the production cost , because of calculate to the accurate of the estimation of cost.

Data of mother plant block:

YEAR	2015	2016	2017	2018	2019
COST	9000	6000	5000	9000	9000

YEAR	Yt	X=t-2017	XYt	X2	TREND VALUES
2015	9000	-2	-18000	4	9300
2016	6000	-1	-6000	1	6300
2017	5000	0	0	0	5300
2018	9000	1	9000	1	9300
2019	9000	2	18000	4	9300
	$\sum Y$= 38000	$\sum X$= 0	$\sum XY$=3000	$\sum X^2$ = 10	

$\sum Yt = Na + B\sum X$

38000=5(A) + B(0)

5A=38000 A=7600

$\sum X = A\sum X + B\sum X^2$

3000=7600 (0)+B(10)

10 B=3000, B=300

Analysis of next year: Yt=A+B(T-2017)

=7600+ 300(2020-2017)

=7600+300(3)

=8500

Data of irrigation with pipeline:

YEAR	2015	2016	2017	2018	2019
COST	5000	4000	3000	5000	5000

$\sum Yt = Na + B\sum X$

22000=5(A) + B(0)

5A=22000 A=4400

Analysis of next year: Yt=A+B(T-2017)

=4400+340(2020 -2017)

=5420

YEAR	Y	X=t-2017	XY	X2	TREND VALUE
2015	5000	-2	-10000	4	5340
2016	4000	-1	-4000	1	4340
2017	3000	0	0	0	3340
2018	5000	1	5000	1	5340
2019	5000	2	10000	4	5340
	$\sum Y$= 22000	∑X =0	∑XY= 1000	$\sum x^2$ = 10	

The operational plan of second seedling production

The obtained information from the seedling production trial could be a consideration in marketing the operational plan of 2nd seedling production, for instance:

(1) application of the nursery administration system and data recording

(2) scheduling on the seedling production for each species

(3) using of standard on operational procedure as for sealing production

(4) monitoring and evaluation on the origin of the source

(5) optimization on the compost usage, and

(6) Recalculation on the sealing production cost.

The nursery administration had been made for all seedling production process so that the nursery management could use it directly for the second process of the seedling production. This administration system was designed to support the nursery accounting system by putting data and information of seedling production process infield.

The scheduling on seedling production for each species was highly required in optimizing the capacity of available replacement beds and in reducing the seedling maintenance cost. The production time could be fixed by determining the rainy season as the time guidance in selecting the ready to be planted seedling. After determining the planting time, it determined the time for selecting the seedling, showing the seeds and determining how long the sprouting process for those seedlings.

The result of sealing production trial provided data on the source of origin for CD seeds with high rate of sprouting variability and high survival rate in the replacement bands and in planting location the seed source was consistently recorded in reducing the high quality seedlingData of total cost of data:

$\sum X = A\sum X + B\sum X^2$

1000=4400 (0)+B(10)

10B=3400 B=340

YEAR	2015	2016	2017	2018	2019
COST	14000	9000	8000	14000	14000

YEAR	**Y**	**X=t-2017**	**XY**	**X2**	**TREND VALIES**
2015	14000	-2	-28000	4	14680
2016	9000	-1	-9000	1	9680
2017	8000	0	0	0	8680
2018	14000	1	14000	1	14680
2019	14000	2	28000	4	14680
	$\sum Y$= 59000	$\sum X$ =0	$\sum XY$= 5000	$\sum x^2$= 10	

$\sum Yt = Na + B\sum X$

59000=5(A) + B(0) , A=11800

Analysis of next year: Yt=A+B(T-2017)

=11800+680(2020-2017)

=13840

$\sum XY = A\sum X + B\sum x^2$

5000=11800 (0)+B(10) B=680

THE NURSERY DEVELOPMENT PLAN

It was decided that the several things could be taken as input materials for the next nursery development. These were:

(1) Making of nursery area border

(2) Improvement of replacement beds and show windows of seedlings collection

(3) Improvement of the inspection road

(4) Improvement of watering installation

(5) Improvement on water throwing path

(6) Establishment of climatology station

(7) Operational plan on the second period seedling production

(8) Making of nursery accounting system

(9) Implementation of seed tracking system

(10) Network establishment and

The making of Nursery Area Border

Fences on the nursery area become an important border to be known by the community in avoiding the cases of land invasion and encroachment. The bordering would also given the land security that was being utilized for the nursery operational activity.

Improvement of Seedling Beds and Show Windows of Seedling Collection

The seedling replacement beds improvement had been conducted by making the sketch of beds location and giving the ascending number of beds and the identity board for each bed. However, this improvement should be followed by making the border for each house permanently by using bricks because it is stronger than bamboo or plastic rope. Actually, this improvement was completed at the project extension period.

The bed improvement should be connected To the production process for species through a a planting of ornamental plants with special colour to make a clear identity for the production area of each plant species in field.

The improvement of inspection road

The inspection road had been made in the process of nursery establishment. However, since the nursery location had a heavy topography and a high risk in landslide, the improvement of the inspection road became an important and crucial issue. The hardening of on the inspection road by using the having blocks without eliminating the function of water absorption into the ground because it is only properly arranged between one stone to another, should be conducted.

The improvement of Water Throwing Path(WTP)

The WTP between the location areas of the replacement bed had to be conducted properly, considering that the nursery area had a heavy topography and had a high risk in landslide if the rain is highly falling.

At present, the WTP had between made by making the implementation protector of WTP following points that made from bamboo to avoid the soil erosion and landslide because the nursery establishment budget was relatively small so that it was difficult to establish the permanent WTP.

The Establishment of Climatology Station

The utilization of IIT nursery as the centre of nursery and technology transfer required the supported information relating to the weather and climate around the necessary location. Therefore, the climatology station was highly required to provide the information related to the quantity, frequency and intensity of the rainfall, the lowest and the highest temperature, wet and dry month in a year, and the average of the daily, monthly, and annual rainfall. The information of weather and climate was very important and useful for

(1) Research and development of sealing production and

(2) Supervision on its growth in the nursery area and in the land of private forest formers.

The operational plan of second seedling production

The obtained information from the seedling production trial could be a consideration in marketing the operational plan of 2nd seedling production, for instance:

(1) application of the nursery administration system and data recording

(2) scheduling on the seedling production for each species

(3) using of standard on operational procedure as for sealing production

(4) monitoring and evaluation on the origin of the source

(5) optimization on the compost usage, and

(6) Recalculation on the sealing production cost.

The nursery administration had been made for all seedling production process so that the nursery management could use it directly for the second process of the seedling production. This administration system was designed to support the nursery accounting system by putting data and information of seedling production process infield.

The scheduling on seedling production for each species was highly required in optimizing the capacity of available replacement beds and in reducing the seedling maintenance cost. The production time could be fixed by determining the rainy season as the time guidance in selecting the ready to be planted seedling. After determining the planting time, it determined the time for selecting the seedling, showing the seeds and determining how long the sprouting process for those seedlings.

The result of sealing production trial provided data on the source of origin for CD seeds with high rate of sprouting variability and high survival rate in the replacement bands and in planting location the seed source was consistently recorded in reducing the high quality seedling.

The establishment of nursery accounting system

The nursery accounting system was divided into four steps, namely: (1) process of tools and materials flow in the warehouse, (2) process of seed sowing in the germination house,(3) the process of seedling replacement and maintenance in the replacement beds, and(4) the process of seedling selection, transportation and planting infield.

The nursery accounting system was established by using the Microsoft Access and designed simply and easily for its operator. Every data recording on production process in field could be directly entered to this program to make the up to date data in a database framework. The nursery officers could retrieve the required data or information in a short time to make the fast and accurate decision making related to the seedling production process in the nursery.

To make easy the field data recording and its data entry to program, the similar color was used for each production process with the active button in the computer. For example, the button for warehouse database was, so that the form of making note the tools and materials floor must be red color too. The color was used to make easy the data entry and to avoid the data entry mistakes in the nursery accounting system.

Implementation of seed tracking system

Actually, this tracking system had to be conducted consistently in the necessary because it had been supported by the nursery accounting system. The nursery officer only need to do the monitoring and evaluation on the deuce seedlings growth (the origin of the c source had been already know) after it was planted in field. it means that the seedling planting process could be considered as the site matching trial on the seedlings produced in the nursery.

The result on seed tracking system could be the valuable information for the FSCD in the activity of certified and certified seeds. It may be a good selection method for seed providers. They only were selected due to their good seedlings growth performance, where its growth and yield in field matched with the soil condition in Ciamisregion.

The network establishment

The network establishment with the stakeholders in the nursery facilitates and process produce seedlings utilization was really e required to support the professional and profitable nursery management.

The statement of nursery as a centre of nursery and seedling production technology required the close relation with the universities in supporting the research and development activity on nursery and the seedling process for the university students who were completed their own thesis.

Institutional system of nursery management

It made the nursery management changes its direction from the free of charge of seedling distributor to the Professional.

CONCLUSIONS

The nursery development was required in the future with various priority activities that should be realized namely:

- Making of nursery area border
- Improvement of replacement beds and show window of seedling collection
- Improvement of the inspection road
- Improvement of watering installation
- Improvement on water throwing path
- Establishment of meeting room
- Establishment of climatologystation
- Operational plan on the second period sealing production
- Making of nursery accounting system
- Implementation of c tracking system
- Network establishment and institutional system of nursery management