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1. Structuring and Managing a Seed Production Department
2. Seed Production
3. Maximization Of Seed Production Through Good Agronomic Practices
4. Working With Contract Seed Growers



# UNIVERSITY OF NAIROBI

Seed Enterprise Management Institute

## SEED PRODUCTION COURSE:

# Structuring and Managing a Seed Production Department

Prof. Kiarie Njoroge

10<sup>th</sup> August, 2015

# OVER VIEW



1. Introduction
2. Organising a Seed Production Department
3. Motivating people
4. Human Resource Management
5. Strategic pillars and Human Resource
6. Recruitments
7. Induction
8. Motivation of Employees.
9. Performance Appraisal.
10. Training
12. Remuneration

# 1. Introduction

- ❖ Any business must have some fundamentals in place:
  - Customers
  - Quality product and services
  - Cash
  - Profit margins
  - Growth and velocity
- ❖ But seed is living and contains genetic potential of the whole plant; the seed has to realise the harvest.
- ❖ Seed has to be produced but other inputs required: land, fertilizer, irrigation(water), pests and disease control, harvest and post-harvest handling.

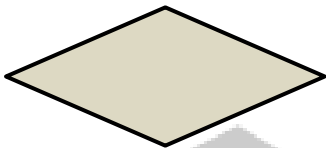
# ...intro



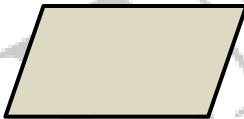
Create a flow chart for certified seed production



Process/Activity



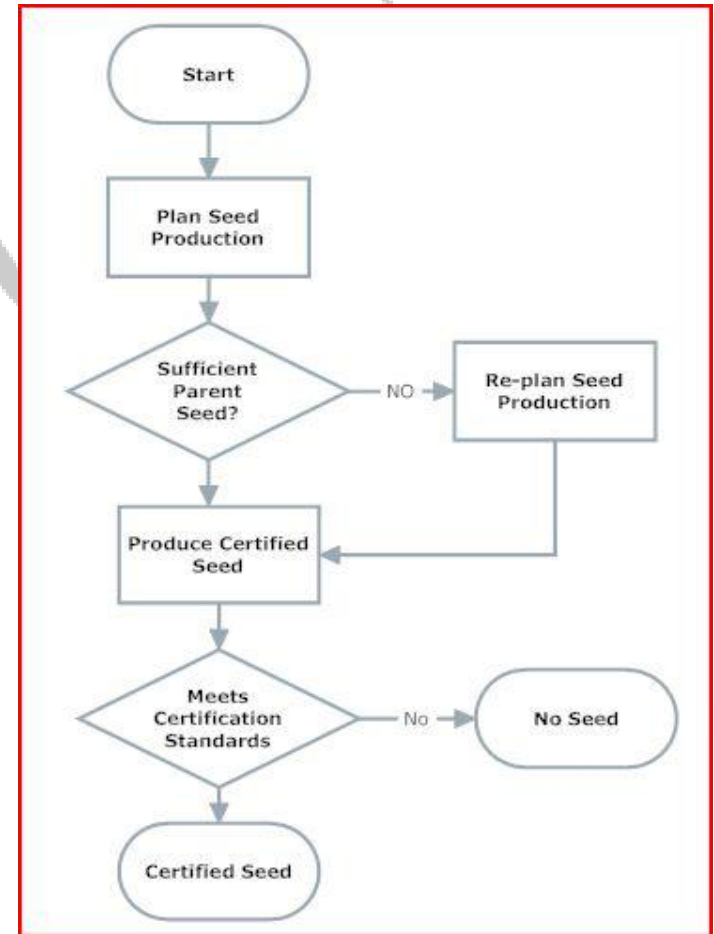
Decision



Data/Information



Document



## 2. Organising a Seed Production Department



Decisions

Activities

Outputs

- What are the measurable **Outputs**?
- What are the main **Activities** required to produce the Outputs?
- How will you manage the Activities needed to reach Outputs? i.e., what **Decisions** need to be made?
- What skill set do people need for each activity?
- What relationships are there amongst activities?
- What feedback information do you need to review decisions and activities?

# ...cont

- A seed has cycle of fixed time(season) and is a product and many factors, some not under direction of operator. Nature plays a critical role (temperature, rains, pests and diseases)
- Males and females must nick at the flowering
- Parents (or foundation seeds) are the raw materials they come from breeders' seed. So at least three seasons required
- Hence fundamentally plan three seasons ahead
- in principle, before you start selling what you produced last year(2013) you have to sow this year(2014)what you shall sell next year(2015)

### 3. Organising a Seed Production Department

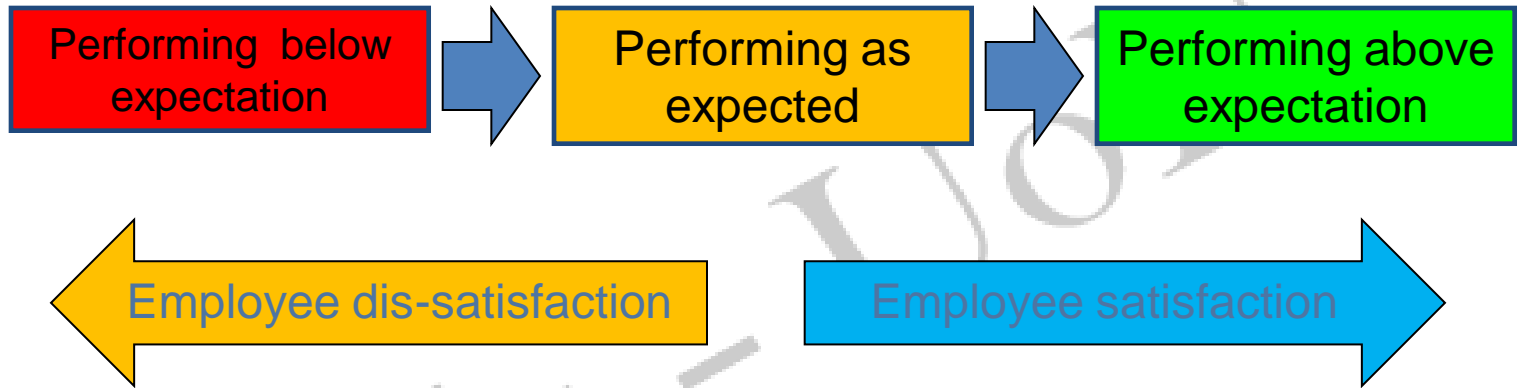


For the Super Seed Company, producing 500 t of maize hybrid seed, 100 t of sorghum seed and 60 t of bean seed, with a warehouse, small processing plant and a 25 ha farm,

- Prepare an organogram for the production department.
- Prepare a list of the capital requirements of the department
- Prepare a list of equipment required for each Inspector/Production Officer



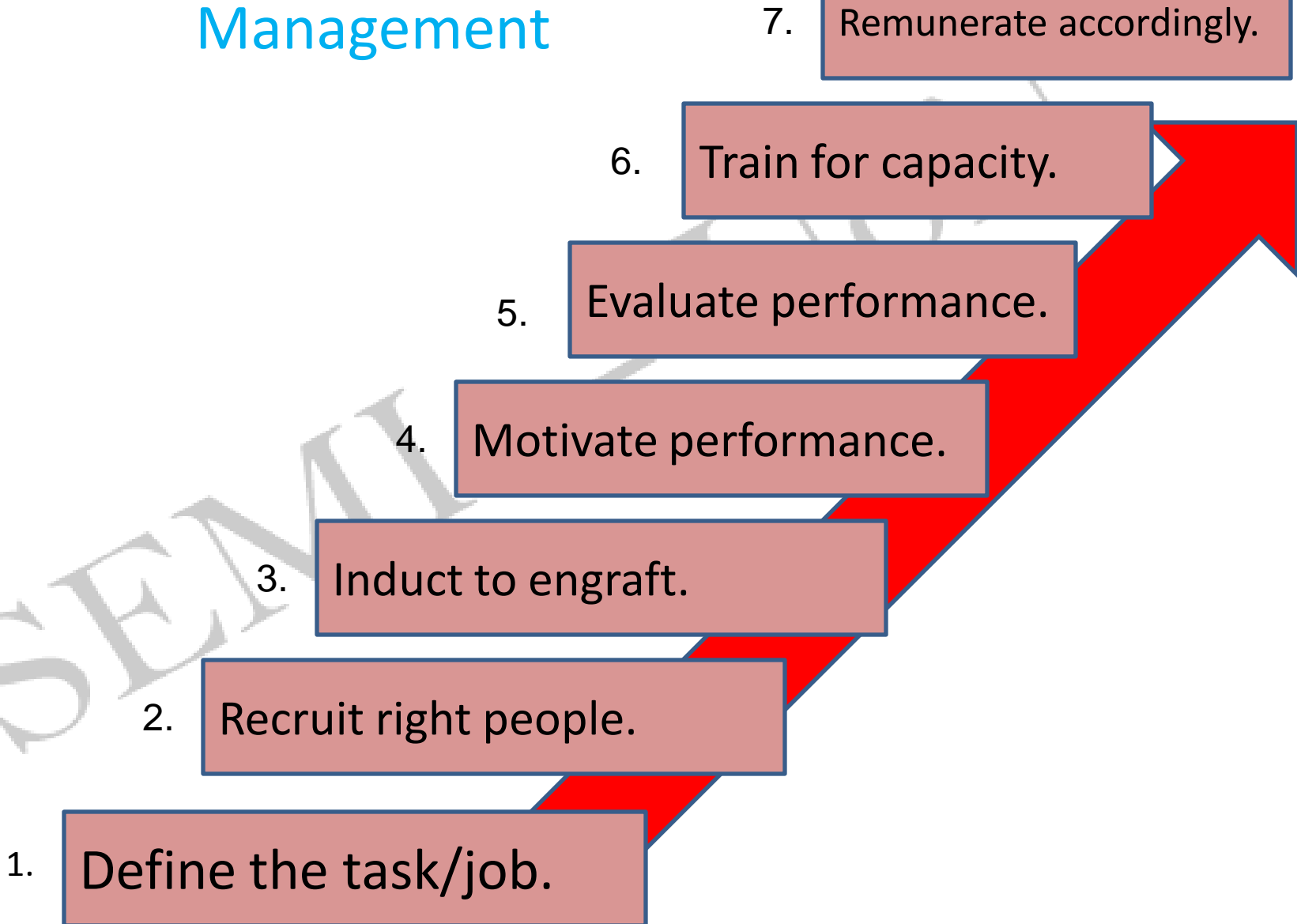
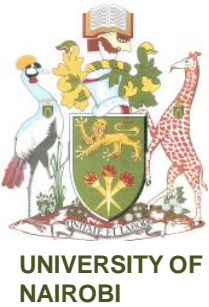
# 4. Motivating people



- Poor working conditions
- Poor leadership
- Low pay

- Goal setting
- Responsibility
- Achievement
- Recognition

# 5. Human Resource Management



## 6. Strategic pillars and Human Resource



### Tasks required in company:

- Recruitment of new employees

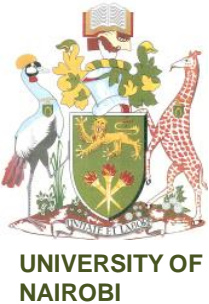
• Induction of new employees

• Motivating employees

- Training employees for competency

• Remuneration

## ...cont



- Business success rotates around human skills and how they are managed. A business is as good as the people, hence management vital.
- Three strategic pillars for success.
  - \* Finance
  - \* Production
  - \* Marketing.

All these are driven by human skills which they should be managed optimally and prepare strategic plans that realize the vision.

## Production will require:



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- Planning to produce to meet set goals
- Contracting growers for different classes
- Processing seed into saleable form
- Conforming to government regulation seed
- Machinery and equipment management
- Careful worker management

# ...cont



- So those in charge e.g. of production must be involved in hiring, duty allocation, training, compensation and ensuring safety and health of employees and customers.
- They need to know how to create environment that;
  - Represent views of the company to the people, but also the views of people to the company
  - Motivate by consultation and building ownership

# ...cont



- Define the critical tasks to optimize human resource
- Incorporate in the job description and ensure they understand nature, responsibilities, performance and expectations.
- Develop a job description
- A job description has the following elements;
  - i. Position title (the job)
  - ii. Duty station (where located)
  - iii. Reporting relationships
  - iv. Expected objectives/ outcomes

# ...cont



v. Tasks needed (and time spent on each)

vi. Remuneration structures

vii. Performance standards

viii. Appraisals

## Notes:

- Job descriptions not static as they change with business growth
- They have to be regularly reviewed
- Review many mean redundancy, re-definition or retraining



## 7. Recruitments



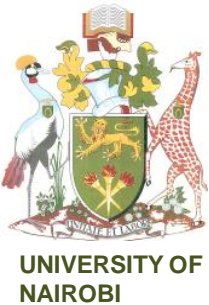
-Recruitment may not be necessary after re-organization;  
You may deploy, sub-contract (to third parties) or hire temporary employees.

Seed business is seasonal; so employment of casual labour necessary, to reduce wage costs.

Remember, efficiency may not necessarily, increase with additional staff

For sustainable remember labour costs efficiency only improves if output increase;

# ...cont



To recruit, 4 steps necessary:

- i. Explore if qualified people exist in the company for re-deployment; then reallocate and recruit for the vacancy created
- ii. Advertise for vacancy in media, most likely accessible to potential candidate (detailing job title, key performance areas, qualifications, contact details, application procedure and closing date for applications)

## ... cont



- iii. Review applications, check references, short list and interview (using same questions)
- iv. Conduct interviews.

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## 8. Induction :

In the process of immersing recruits into the culture and vision of company.

This process should cores:

- Vision and mission
- Corporate values
- Corporate structure
- Roles, responsibilities and reporting procedures
- Health and safety regulations



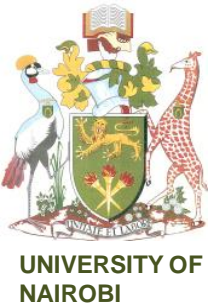
# ...cont



Marketing, production and financial strategies.

- Operational procedures.
- Human resource policies. (e.g. leave, sickness, remuneration, grievance, discipline)
- Length of induction depends on responsibility/security of position.

# ...cont



## 9. Motivation of Employees

- An employee is a factor of production like money or machines, but people think, create, learn, have emotions and feelings; and can react.
- A manager or supervisor has powers to have things done; he has responsibilities over people. Productivity and efficiency depends on how he/she interacts with people.

# ...cont



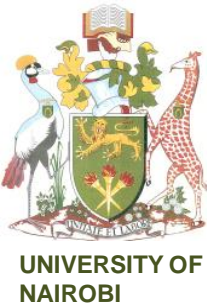
Good relationship depends on four elements:

- Appreciation: of the juniors importance.
- (Friendliness and not meanness, etc. )
- Trust: as they have been trusted by the company, they have to trust others. It takes time to learn who to rely on, put honesty on, etc.
- Respect: everybody deserves respect. Do not avoid responsibility, value the workers and avoid unnecessary criticism.

NOTE: like trust, once lost respect is lost, restoration is difficult.

- Understanding: people desire to be understood; and this is controlled on how we people communicate. External factors also influence.

# ...cont



- People are most important resources in the business and special skills are required to manage and motivate staff and laborers. Have cause to complain or get dissatisfied.
- Motivate achievers; well treated employees do not have cause to complain or get dissatisfied.
- Remember employees have their expectations; if competent they expect fair treatment and respect.



# ...cont



Motivation requires;

• Participation in defining what is expected of them.

- Be given an opportunity to prove themselves.
- Be given an opportunity to improve if below expectation.
- Commensurate remuneration if performance is good.
- Performance can be:
  - Minimum: less than expected, below.
  - Expected: effective and efficient.
  - Maximum: excellent.

# ...cont



Motivation comes from:

- Job security and promotion.
- Sense of achievement and usefulness.
- Opportunity for personal growth.
- Learning new skills.
- Good pay, benefits, status.

# ...cont



-motivators include:

- Poor working conditions.
- Frustrating policies.
- Criticism, threats, unfair treatment.
- Few opportunities for progress.
- Unattainable targets and unclear standards. Low pay and benefits.

# ...cont

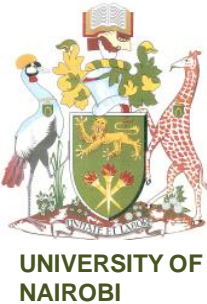


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## Performance Appraisal.

- People remain because they feel satisfied, and companies keep people because they help to attain their vision set
- Performance appraisal has two functions:
- Achievements measured and outputs. (e.g. quality of seed produced), an objective measure . This more important
- Behaviors as related to competencies, style or appearance; it is subjective

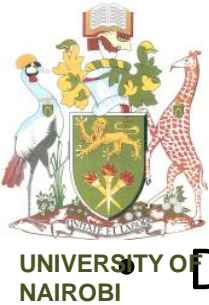
# ...cont



## Four points to remember:

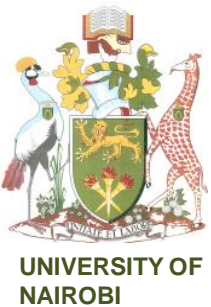
- i. Plan appraisal and inform employees in advance (with criteria to be used). Objectives and milestones should be participatory.
- ii. Execute the appraisal in a friendly and professional manner (not confrontational); as opportunity to assess performance and get feedback.
- iii. Assess job performance objectivity in terms of quality, quantity, cost and timelessness of outputs and not personality, conduct or other subjectivity measure. Allow employee opportunity to respond.
- iv. Poor performance should be punished (not tolerated) to avoid lowered profits, poor performance and breeding discontent, and reduced commitment.

# ...cont



- Do not attack the person but offer assistance at first, but stating the problem openly. Excuses will be given for poor performance but look for solutions instead.
- Encourage the poor performers, and if no improvement repeat process at least twice; second time accompany with a written warning.

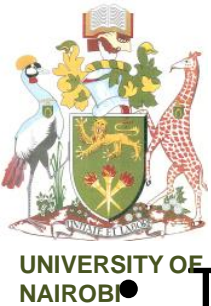
# ...cont



## 11.Training

- While as competent people as possible should be hired, getting perfectly qualified and proficient.
- Technologies are also in constant state of change, and new ways emerge all the time.
- Training becomes essential therefore to bring in specialized skills for better quality and achieve new targets.

## ...cont



- Training targets better productivity, benefits the company contributes to employee, self satisfaction and improved market value of themselves. They achieve chance for promotion and motivational stimulus.
- Training areas should target factors in a needs analysis that has gaps identified.



# ...cont



## 12. Remuneration

- Employees get paid for work done and compensation should be fair and sufficient; Work performed is accompanied by commitment and performance.
- You remunerate to reward not to punish.

**THANK YOU FOR  
LISTENING**

# SEMIs COURSE

SEED ENTERPRISE  
MANAGEMENT INSTITUTE

(SEMIs)

SEED PRODUCTION

by

TERESIO. C. RIUNGU (PhD) AND KIARIE NJOROGE,  
(PhD)

# Outline

- Introduction
- Cultivars
- Origin
- Growing environments
- Mating systems
- Isolation
- Field layouts
- Hybrid seed production
- Maintenance

# SEED PRODUCTION COURSE

- **INTRODUCTION**

- Agricultural crop production is based on **seed or plant material** production
- **Seed** is a plant part containing **seed coat, embryo** and in some plants endosperm
- Farmers grow seeds of different **varieties/Cultivars**

# Varieties/Cultivars

- **Variety** is a group of **similar plants** which by structural features /appearance and performance may be identified from other varieties within the same species
- Have distinct **morphological** (phenotypic homogeneity-sometimes **genotypic**) characters
- **Cultivar** –Is a a cultivated variety
- Bulking (multiplication) of introductions
  - Selection and bulking from introductions
  - Hybrid from introduced materials or introduced materials crossed to adapted varieties

# Origin of Varieties/Cultivars

- Developed by public or private breeders/companies
- Bulking (multiplication) of introductions
- Selection and bulking from introductions
- Hybrids from introduced materials or introduced materials crossed to adapted varieties (Developed hybrids)
- Increase and distribution by seed companies
- Maintenance-Breeder/ Seed Company

# ...Varieties

- Introductions must be inspected/ screened for:
  - Adaptability
  - Diseases and pests
- If found suitable, then:
  - Propagation (increase)
  - Testing
  - Bulking/multiplication
  - Distribution for commercial seed production
  - Commercial production



# Production Environments

- Edaphic – soil
  - Nutrients requirements
  - Soil type
  - Pest prevalence
- Climatic Conditions
  - Temperature
  - Rainfall/Risk of drought during the season

Climate change mitigation-e.g Drought tolerance

# Mating/Reproductive Systems

- Mode of transmission of genes from one generation to the next through sexual reproduction
- Agricultural species mainly divided into two predominant mating systems according to pollination (transfer of pollen from anther to the stigma of the flower)
  - Self pollinating
  - Cross pollinating

# ...Mating system

- Self pollination
  - Transfer of pollen from anther to the stigma of the same flower or within a clone
- Cross pollination
  - Transfer of pollen from an anther of one plant to the stigma of another plant or different clone
  - This influences inbreeding verses out-breeding on the genetic structure of the population
- This also influences approaches regarding seed production

# Self pollinated crops

## LEGUMES

- Field beans
- Chick pea
- Soyabean
- Cow pea

## CEREALS

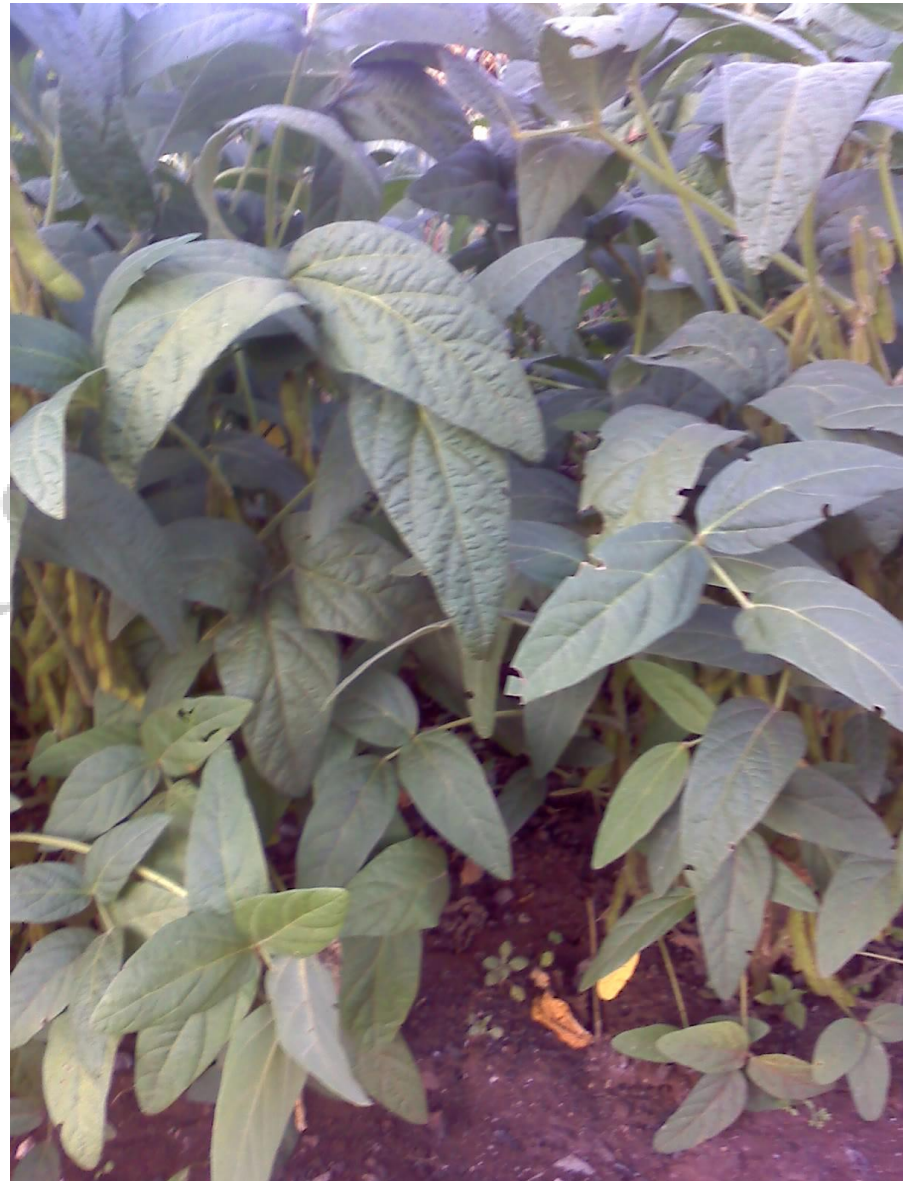
- Wheat
- Barley
- Rice. etc

# soyabean

- Demo Plot



- Soya  
Plants



SEMI





# Seed production in self pollinated crops

- Self pollinated crops are genetically similar- are homogenous and homozygous and their seed production is not complicated
- The basic method by which seed of varieties is developed is through
  - Introduction
  - Selection and
  - hybridization



# INTRODUCTION

- Seed of variety is introduced
- Seed is screened/ against diseases /factors
- Multiplied
- Isolation may not necessary
- Prevent mixing
- A number of varieties can be produced in same field as long as contamination is avoided at planting, harvest and post harvest handling
- Seed is packaged and distributed for commercial production

# Selection

- Process by which plants or groups of plants are sorted out from mixed population to:
  - To clean them and
  - Improve them
    - **Mass selection**- Removal of unwanted/wanted plants
    - **Line selection**- picking of wanted plants and growing head to row
  - Followed by multiplication of selected rows/plants
  - Testing/Distribution

# Hybridization

- Plants with required traits are selected and crossed
- Crossed lines tested for combination of required traits
- Line/variety testing/with others NPT/DUS
- Seed multiplication
- Seed distribution for commercial production
- Maintenance by good field management

# Seed production

- Seed is planted on clean ground
- Field not planted previously with same crop variety
- Pests/Weed-noxious/insect/disease managed
- Purity maintained
  - Field inspection
  - Rouging of off types
- Harvest and post harvest handling

# Seed production/Distribution

- The seed is cleaned,
- Dried
- Treated
- packaged
- Distributed to the farmers (cooperatives and individual farm shops)

# Cross pollinated crops

- Maize
- Sunflower
- Sorghum
- Avocado
- Cassava
- Mustard
- Pearl millet
- Sugarcane etc

# MAIZE

KARI Mid-  
Altitude  
Variety









# SORGHUM



# Methods of seed production

- Introduction
- Selection
- Hybridization

# Introduction

- Introduction of parental materials
- Screening and selection
- Bulking of parental material/isolation
- Commercial seed production
- Distribution
- Commercial production

# Selection

- Process by which plants or groups of plants are sorted out from mixed population to
  - To clean them and
  - Improve them
    - **Mass selection**- Removal of unwanted or wanted plants
    - **Line selection**- picking of wanted plants and growing head to row
    - **Single plant selection**
    - **Recurrent selection**
  - Followed by multiplication and distribution or for Crossing (hybridization)

# Hybridization

- Hybrid - F1 cross between parents- inbred lines, varieties, clones or other populations that are genetically dissimilar

- **Why Hybrid?**

Exhibit hybrid vigour (heterosis) - enhanced performance with respect to a certain character- size, yield etc

# Hybridization

- Inbred lines development/characterisation
- Evaluation and selection
- **Hybrid production**
- Hybrid evaluation and selection
- Bulking of parental lines
- Commercial hybrid production
- Distribution
- Commercial production

# Seed production in cross pollinated crops

- Parental lines multiplied in isolation- time or space
- Seed producing parents planted in isolation
- Appropriate row ratios used between seed producing parent and the pollinating parent
  - Sunflower, Maize, 3:1
- Hybrid from female parent
- Male parent removed or used for seed increase

# Hybrid Production

- Through emasculation in maize





# Sunflower hybridization

- Cytoplasmic male sterility system used
  - NO MANUAL EMASCULATION–
- Establishment of a populations
- Develop inbred lines
  - Male sterile (A- Line)
  - Male sterility Maintainer (B- Line)
  - Male sterility Restorer (R- line)

# ...Sunflower hybridization

## Hybrid production

- CROSS Line A X Line R

## Hybrid seed production

- Bulk A line
  - Cross AxB
  - Bulk R By Selfing (Self pollination)

# Isolation

- For both self and cross pollinated crops
- Isolation-Space/ Time is important
- **CROSS POLLINATED CROPS**
  - Avoid cross pollination where not desired
    - Inbred lines
    - Production of different hybrids

## **SELF POLLINATED CROPS**

- Avoid contamination

# Classes of Seed

- *Breeders seed* is seed that is provided by the breeder following the release of a variety
- The seed is planted in fields not subject to volunteer plants of the same crop and kept free of weeds.
- The field is rogued several times during the season for off types
- The harvest from this crop is bulked and used to produce other classes of seed i.e.
- **Foundation(pre-basic), Registered (basic) and Certified.**

# Maintenance of Seed Stocks

- During production varieties become contaminated with off types
  - Need to maintain variety purity (by plant breeder/seed company)
  - Plant small plots each year and remove off types
  - Self pollinated crops – Easy

# Maintenance

- Hybrid
- Complicated-Depends on the number of inbred lines or if CMS system is used
- Fields must be isolated from contaminating pollen but adequate amount of appropriate pollen vector must be provided for insect – pollinated species
- Fields inspected and off types removed

## ...Seed Maintenance

- Where artificial emasculation is used the female parent must be emasculated before pollen shed occurs
- CMS SYSTEM
- A, B and R lines must be multiplied and maintained
- A and R line to be used to reproduce the hybrid

# SUMMARY

- Mating system will determine on how seed production is managed
  - Isolation
  - Field layout
  - Maintenance



• ***THANK YOU***

*Asante Sana*

# Working with Contract Seed Growers

Prof. Kiarie Njoroge

12 August, 2015

Acknowledgment:

Dr. John MacRobert  
Dr. David Ndung'u

# Contract Seed Growing

- Outgrower Scheme: contractual partnership b/n growers or landholders and a company for the production of commercial seed
- Mutually beneficial relationship
  - The seed company needs the seed grower
  - The seed grower needs the seed company
- Common objective: To reduce market uncertainty and secure highest possible return on investment

WIN - WIN



# Grower selection and recruitment

- Selection process requires establishment of criteria.
- Recruit those that meet the criteria.
- Recruit those that will help achievement of your goals.
- Therefore selection & recruitment should be thorough and objective
- **Avoid trouble makers**



# Build long term relationships

- This takes time but it can be done.
- Businesses thrive on repeat business, so there is a mutual desire to build long-term relationships
- Make your company worth growing for
- Help your growers to be successful farmers
- Get involved in events in their farming community
- Success with farmers is more than production – it involves building relationships

# Growers' association

- A growers' association represents the interests of seed growers.
- Lobby for fair contracts, prices, inputs on behalf of growers.
- Represent growers when pricing models are established.
- Also helps in communication with growers
- Once you reach an agreement with the association, all parties should respect that agreement.

- **But they can be powerful and have a lot of bargaining power in their favour.**



"I'm getting the fire-breathing dragon with wings. He wanted \$200, but I talked him down to fifty bucks."

# Reasons for Low Productivity

- Resource limitations
  - Inputs, infrastructure, labour
- Poor management
  - Fertility, population, weeds,
- Poor timing
  - Planting date, missed split planting, irrigation,

# Reasons for Grower Defaults

- Not planting
- Crop failure (drought or management)
- Insufficient resources (labour, cash)
- Quality failure
- Side-marketing
- Side-harvesting
- Domestic consumption



# Reasons for Company Default

- Poor support services
- Un-timely purchase
- Non-purchase
- Late payment for seed
- Shifting quality specifications
- Poor overall Execution of Strategy



# Contract Agreements

*Any successful contracting method will seek to improve productivity by addressing underlying causes of farmer and company default*

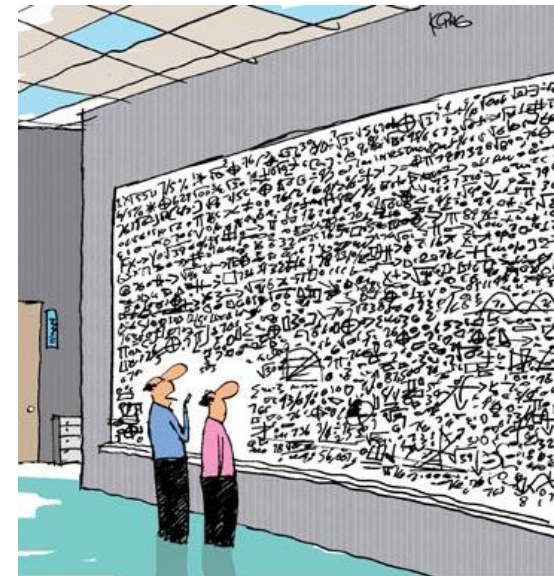
- Consult farmers when drafting the agreement
- Ensure that farmers understand the agreement
- Specify the responsibilities and obligations of each party
- Indicate the manner in which the agreement can be enforced
- Specify how and when farmers will be paid

# Contract Agreements Contd...

- Specify the remedies that can be taken if the contract breaks down



- Keep the agreement as simple as possible avoiding lengthy legalities



*"And that, in simple terms, is how you start a small business."*

# Price transparency

- Profitability/sensitivity analysis to ensure both company and farmers can profit in all scenarios
- Encourage farmers with production bonuses
- In a non-inflationary environment prices can be agreed at the start of the season
- In an inflationary environment farmers should be made aware of the formulas used in calculating prices
- Prices must be sufficiently high to prevent side-marketing

Acknowledgement: M. Dawes

# Key Aspects for Small-holder Hybrid Seed Maize Production

- Community Co-operation
- Capacity Building of Farmers
- Contract Farming
- Cost Management



# Community Co-operation

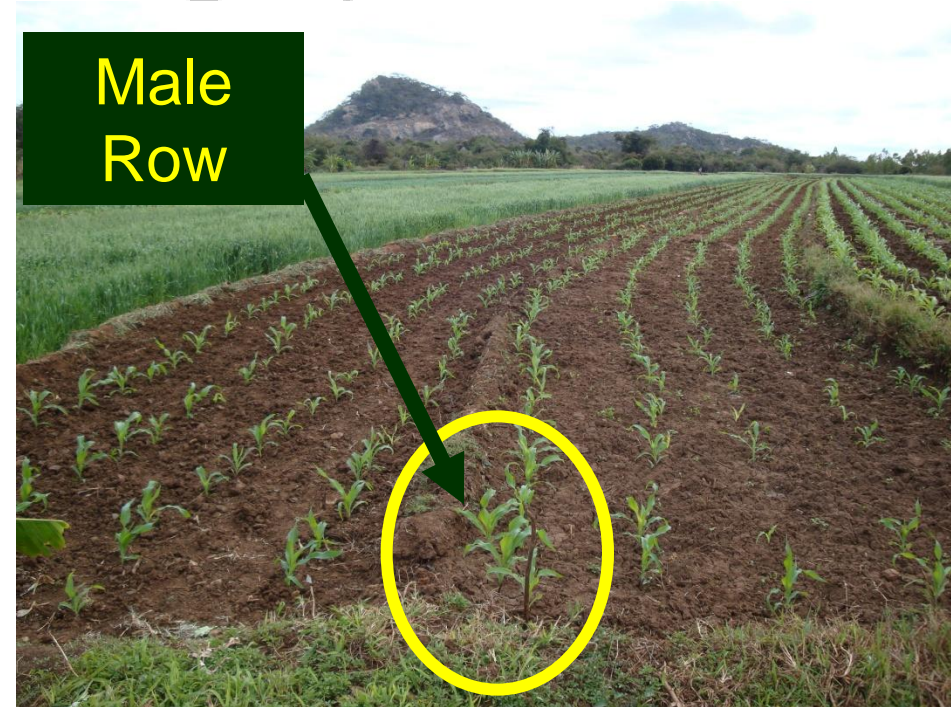
- Maize Seed competes with Maize Grain
  - How to compensate?
- Community Isolation Agreement
  - How to get unity of purpose?
  - Compensation for affected farmers?
- Community Structures and Leadership



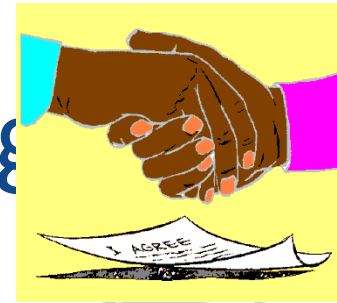


# Capacity Building

- Difference between maize grain and hybrid seed
- Crop Agronomy
- Seed Quality



# Contract Farming



- Must be built on trust and relationship
- Farmer consultation in Contract Drafting
- Individual or Group
- Obligations of Seed Company
- Obligations of Farmers





# Cost Management

- Costs proportional to the number of farmers and production level
- Inspection costs
- Provision of Production Credits to Farmers
- Recovery of Seed

# Costs of Seed Production

- Farmer Costs
  - Inputs, e.g., fertiliser, labour, chemicals, irrigation
- Company Costs:
  - Parent seed
  - Seed purchase from growers
  - Inspection and certification costs
  - Transport, bags, warehousing

# Price determination methods

- Production cost based model
  - A profit margin is added to the cost of production of the crop
  - Yield potential of a female parent is put into consideration
  - The commercial price is also used as a check
- Market price based model
  - A percentage mark up is added to the average market price of the commodity (common with OPVs and SPVs)

# Price determination Contd..

- Gross Income model
  - The farmer's expected gross income is divided by the expected yield of the seed crop
- Equivalent Gross Margin Model
  - In this model, the farmer expects to earn an equivalent gross margin per ha from the seed crop as he/she could earn from another competing crop.

# Bottom Line!

- Both parties must be in mutual Agreement on price of the produce right from the very beginning !



# Thank you for your attention



# MAXIMIZATION OF SEED PRODUCTION THROUGH GOOD AGRONOMIC PRACTICES

Prof. Kiarie Njoroge

Faculty of Agriculture, University of Nairobi

# OUTLINE OF PRESENTATION

- Introduction
- Field Management: *Economic use of Resources*
- Seed Crop Management: *Beyond a Normal Crop*
- Proper Seed Crop Management: *Requires Special Skills*
- Effective Management: *Is about Timeliness of Operations*
- Good Management: *Emphasizes Reduced Risks*
- Efficient Management: *Is all about Observing Quality Standards*
- Efficiency means *sufficient involvement of all Stakeholders*
- Conclusion



# INTRODUCTION

- Seed farm management involves:
  - Forward planning and Budgeting
  - Rotation Programme
  - Land and its preparation
  - Managing Soils (Fertilization & Irrigation)
  - Farm Machinery
  - Economics of Farm Labour Use
  - Adjusting to Risks and Uncertainties
  - Farm Credit

# ...INTRODUCTION

- Breeders select varieties with clear qualities e.g. yield, shape, size, cosmetic appearance, shelf life and pest resistance.
- Breeders' seed is provided in very limited quantities, and need to be increased, and qualities bred in to them maintained.
- Conditions for quality maintenance are:
  - Correct site selection
  - Correct planting/sowing design or layout.
  - Proper field management(from sowing to harvesting)
- **Caution:** Field quality may easily be compromised by poor post-harvest handling.

# ECONOMIC USE OF RESOURCES

- Proper field management stresses efficient use of resource inputs including:-
  - Fertilizer
  - Irrigation water
  - Human resources
  - Spacing
  - Soil Water
  - Pest control
- All these are profit – criteria, and are fundamental determinants of efficient resource utilization.
- But non-profit criteria sometimes may be critical e.g. ecological/environmental quality, waste control/recycling and human values.

# BEYOND A NORMAL FIELD CROP

- Seed production is more valuable than grain hence apply higher standards of management.
- Three areas of attention:-
  - Timeliness
  - High standards of agronomic inputs
  - Reduced input wastage
- In principle agronomic standards for seed crop are similar to non-seed crop .
- High quality seed cost more to produce than grain
- Production should therefore be in areas where soils and growing conditions are most favorable for the crop.

# Produce only for the market...

- Do not produce more commercial seed than necessary (unless crop is “high value, low volume” e.g. tomatoes)
- You may even have to plough down a crop early to avoid losses in case a bumper crop is expected
- It is better to “sell all and regret” than to “keep and regret”
- “Seed is quality by another name”; no quality, no seed (Certification agencies make sure this is so)

# Seed crop is a normal crop, and more....

- A normal crop aims at:
  - High yields (size, weight)
  - Good quality (colour, feel, uniformity)
  - Resistance to stresses
  - Appropriate maturity (fitting into the season)
  - Breeders have incorporated these traits into varieties and seeds should deliver them to farmers

## ... BEYOND A NORMAL FIELD CROP

- The production of a seed crop differs from a non-seed crop in some aspects e.g.:
  - Lower planting densities for maximum development.
  - Isolated fields
  - Other additional costs: rouging, detasseling (for hybrids), field supervision and inspection.
  - Different field layout and harvesting.
  - Optimal stands essential.

## SPECIAL SKILLS REQUIRED

- In case of  $F_1$  hybrids, the males and females are well defined e.g. morphological traits well described
- Extra care required for inbreds as they are weaker and more vulnerable to environmental stresses
- The costs of producing different seed classes differ e.g. in maize, single crosses are the most expensive.



# TIMELINESS OF OPERATIONS

- A seed cycle has a fixed time (season)
- Operations and input application should be punctual
  - Males and females planting may need to be staggered; they must nick
  - Isolation is required to avoid contamination
  - Also planting, weeding, top dressing, pesticide application, detasselling of females, male harvesting etc.
- Fertilization is of particular interest: it should be timed to maximize effect:
  - -Plant (N, P, K, S) before or at sowing help early crop
  - establishment
  - -Top-dressing of N is for rapid vegetative growth.

## ... TIMELINESS OF OPERATIONS

- Micronutrients may be needed to ameliorate particular deficiencies
- Pesticides to control weeds, pests and diseases should be well timed through early detection of damage (scouting to assess economic threshold)
- For pesticides ensure : Correct rate and timing, spray method and volume delivered, closely observed safety measures
- Other aspects of importance: timely harvesting (not too early, not too late) because too early means not drying enough and compromises seed viability; too long crop becomes vulnerable to weather, theft and pests
- Remember the 3 natural elements: Rain, temperatures, insects and diseases. Nature is capricious.

# REDUCTION OF RISKS

- Seed production should always aim at reducing the *economic risks*:
  - Drought/poor management
  - Insufficient isolation
  - Inadequate detaselling
  - Excessive off-types/requires
  - A synchrony between pollen & silking contamination
- Weeds incur high costs, so remove them
- Inputs are expensive so use them efficiently
- Too much may be harmful/toxic: too high standards may cause lodging. Just apply enough.

# MANAGEMENT STANDARDS

- Realization of potential is linked to high standards of management:  
*Precision and accuracy* in application of standard.
  - Precision = degree of exactness
  - Accuracy = Minimal deviation from standard
- This applies to inputs, especially sowing and fertilizer. (Side dressing or spot placement are better than broadcasts).
- Spacing has an optimum to be aimed for and these are derived from research at given environment and variety. Avoid gaps and uneven stands.
- Precision and accuracy (in application and safety) also are needed in weed control, pesticide application and harvesting.

## ... MANAGEMENT STANDARDS

- Seed is fundamental to life, and although a commodity of trade, it is alive.
- Therefore handling of seed in store and fields must ensure:
  - Trueness to type
  - Avoidance to contamination
  - Proper germination and vigour

# STAKEHOLDER INVOLVEMENT

- Production involves several stakeholders:
  - Breeders
  - Certification agents
  - Production agents/companies
  - Growers (specialist farmers) of guaranteed fidelity.

# CONCLUSION

- Field management emphasizes seven principles:
  - Economic use of resources to generate maximum profit
  - Specialized skills beyond that of a normal crop
  - Timeliness of operations
  - Precision and accuracy
  - Reduced risks
  - Quality standards
  - Involvement of others
- Seed production is technical and must follow strict guidelines and regulations.