# Effect of Ratooning and Nitrogen Application on Cotton Yield and Quality of Cotton Varieties in Central Kenya

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## Outline:

- Background
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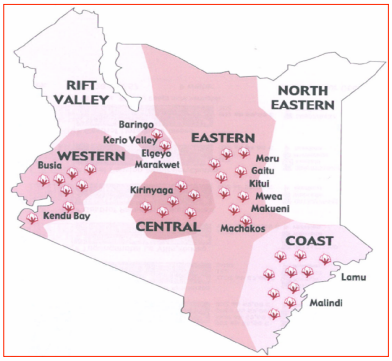
- Conclusions and recommendation

## Background

- Cotton has been indentified as crucial in fighting poverty, reviving the economy of Kenya and is considered a spring board for industrialization in Kenya's vision 2030.
- Though grown in 24 out of 47 counties, it is mainly rain fed, small scale and labour intensive characterized by low input usage and low (572kg/ha) despite the yield potential of the current commercial varieties (2500kg/ha)
- Kenya has a low production (40,000 bales ) despite a potential of 300,000 bales against demand of 200,000 bales annually.
- (1 bale of lint =185kg)

## Main Cotton Producing Areas




## Causes of Low production and productivity

- Lack of sustainable input (pesticides, pumps, fertilizers) provision and affordable credit to farmers
- Marketing (fluctuating prices, poor storage and transport) and lack of well coordinated farmer organizations.
- Poorly ranked by farmers resulting low investment in cotton poor agronomic practices

## Statement of problem

- A survey conducted in 2010 showed that 14% of cotton farmers grow ratoon cotton despite advice against the practice . Mealybugs and Thrips hitherto minor pests have become major threat to cotton.
- Observance and enforcement of closed season is poor mainly due overlap of cotton crop season.
- Farmers' reasons were; expected higher yields, low labour input, possible late supply and poor seed, low and unreliable rains despite dangers of diseases, pests and compromised fibre quality
- Inadequate information on ratoon effects especially on fibre quality and consequently competitiveness of Kenya cotton

## Objectives

- ❑ Mainly to enhance cotton production and productivity by improving agronomic practices in small-holder cotton production systems.
- ❑ Specific objectives:
- To determine the effect of ratooning on growth, yield, and ginning outturn of three cotton varieties (HART89M , F962 and A540 ) in Central Kenya
- To determine the effect of ratooning on pest infestation
- To determine the effect of N application on performance of ratoon

## Materials and Methods

- Three cotton varieties (HART 89M, A540 and F962)
- Cut heights (5 cm, 10 cm and 15 cm above ground surface) and control, and 2 levels of nitrogen (N) fertilizer application levels (0 and 110 kg N $ha^{-1}$). Burn stalk
- Split split arrangement and a Completely Randomized Block Design (RCBD) with four replications.
- Data: plant height, plant count, number of sprout stems, pest counts, cotton yield, GOT, and percent of grade A seed cotton.
- A single roller gin was used to get GOT
- Analysis of variance; Genstat software, and means compared using Fisher's least significant difference (LSD) test at a probability level of 0.05

## Effect of ratooning and nitrogen application on growth of ratoon

- Plant population density of ratoon crop was significantly ($P \leq 0.05$) determined by the variety and cut height at ratooning.
- Cut height determined the number of sprout stems of ratoon crop
- Heights 15 cm and control had higher plant density
- Cotton variety F962 had higher plant density than A540 that did not differ from that of HART 89M .
- Nitrogen application did not affect plant density of ratoon
- Nitrogen application increased number of sprout stems and height of ratoon crop significantly.

## Effect of Ratooning on Growth of Cotton

| Cut height | Plant Count per plot | Plant Height (cm) | No. of Sprout Stems |
|---|---|---|---|
| Control | 39 a | 124.5 a | 1.0 d |
| 5 cm | 24 d | 114.1 b | 4.9 c |
| 10 cm | 28 c | 114.2 b | 5.5 b |
| 15 cm | 34 b | 115.9 b | 6.2 a |
| Mean | 35 | 117.0 | 4.4 |
| CV% | 12 | 8.5 | 8.6 |
| $LSD_{0.05}$ | 2.2 | 5.7 | 0.2 |

## Ratooned cotton plants

## Effect of Variety on Growth of Cotton

| Cotton Variety | Plant Count | Plant Height (cm) | No. of Sprout Stems |
|---|---|---|---|
| HART 89M | 30.3 b | 120.4 a | 4.6 |
| A540 | 29.1 b | 117.6 ab | 4.3 |
| F962 | 33.7 a | 113.6 b | 4.2 |
| Mean | 31.0 | 117.2 | 4.4 |
| CV% | 12.4 | 8.6 | 8.6 |
| $LSD_{0.05}$ | 1.9 | 5.0 | 0.9 |

## Effect of ratooning and N application on seed cotton yield and quality

- Ratooning had a significant ($P \leq 0.05$) effect on first season and cumulative seed cotton yield
- Cut height of 15 cm had a significantly higher seedcotton yield than control.
- Nitrogen application did not affect yield of ratoon crop significantly
- Ratooning did no affect visual grade of seed cotton

## Effect of Ratooning on Seed Cotton yield of Ratoon Cotton

| Cut height | Seed cotton yield (kg/ha) season 1 | Cumulative seed cotton yield (kg/ha) |
|---|---|---|
| Control | 856 b | 2241 b |
| 5 cm | 531 c | 1802 c |
| 10 cm | 1120 ab | 2428 b |
| 15 cm | 1390 a | 2822 a |
| Mean | 974 | 2323 |
| CV% | 40 | 27 |
| $LSD_{0.05}$ | 325 | 371 |

## Effect of ratooning and nitrogen application on Ginning Outturn (GOT)

- Variety had a significant ($P \leq 0.05$) effect on GOT.
- Variety F962 having significantly higher GOT than A540 and HART 89M.
- Cut height and nitrogen application did not affect GOT

## Effect of Ratooning on Ginning Outturn (GOT)

| Cotton variety | GOT (%) |
|---|---|
| HART 89M | 36.1 b |
| A540 | 37.1 b |
| F962 | 38.7 a |
| Mean | 37.3 |
| $LSD_{0.05}$ | 1.1 |
| CV % | 4.1 |

## Effect of cut height and n application on pest incidence in ratoon cotton

- Ratooning significantly increased red spidermites (*Tetranychus* species), mealybugs (*M. hirsutus*) and thrips (*Frankliniella* species) infestation in ratoon cotton.
- Ratooning did not have a significant effect on infestation by stainers (*Dysdercus* species) bollworms (*H. armigera)* and aphids (*Aphis gossypii)*
- There were no pest preference on the three cotton varieties
- Nitrogen application increased aphid infestation and not the other pests.

## Effect of Ratooning on pest incidences in ratoon cotton

| Cut height | % M/bug | Mites | Thrips |
|---|---|---|---|
| Control | 1.0 d | 18.0 ba | 27.5 b |
| 5 cm | 8.0 c | 16.5 b | 29.6 b |
| 10 cm | 34.0 b | 19.2 a | 40.7 a |
| 15 cm | 50.0 a | 20.4 a | 36.4 ba |
| Mean | 23 | 18 | 33.5 |
| CV% | 31 | 27 | 52 |
| $LSD_{0.05}$ | 4.0 | 2.9 | 10 |

## Conclusions and recommendations

- Ratooning may not necessarily increase yields and save on labour, subsequent need for frequent sprays and danger of pest resistance may eventually lead to reduced competitiveness of cotton
- There is need for frequent farmer training and demonstrations on negative consequences of ratooning and asses and demonstrate its effect on fibre qualities

## Way foward

- Asses fibre qualities of lint from ratoon both at farmer and research level over the whole season
- Assurances of seed quality to farmers. Already certified seed production process in progress
- Avail shorter period maturing varieties: Evaluations in progress.
- Adopt conservation tillage in cotton farming .

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