

Kutsaga releases a Katambora Rhodes grass variety (G HR1) for nematode management under tighter rotations

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TOBACCO RESEARCH BOARD

KUTSAGA

PRESENTATION OUTLINE

- **Introduction**
- **Variety Development**
- **Variety evaluation (Field trial)**
- **Results**
- **Conclusions**
- **Acknowledgements**

INTRODUCTION

- **Rhodes grass (*Chloris gayana*) introduced from the Cape Province in the early 1900s**
- **Important crop in soil structure management and root knot management**
- **Suppresses root-knot nematodes in tobacco farming systems**

BACKGROUND



KM10 – AFTER GRASS



KM10 – AFTER KM10

BACKGROUND

- The grass used for 3 to 4 years before the next tobacco crop
- However, after the land redistribution, 3 to 4 year rotations not possible due to reduced land sizes

BACKGROUND

- **Additionally, grass out crossing in nature- gradual loss of RKN resistance over time**
- **Therefore necessary to address these limitations to RKN management**

OBJECTIVES

- **To develop a grass with higher RKN suppression ability for use in shorter rotations**

METHODOLOGY

1. Development of the variety
2. Greenhouse evaluation of the variety
3. Field evaluation

Variety Development

- Recurrent selection
- Intercrossing of the resistant selections
- Repeatedly inoculated with root-knot nematodes and assessed for RK in the greenhouse

- **Resistant segregants identified**
- **Resistant selections passed on to next cycle (6 cycles)**
- **New variety Grass High Root Knot Resistance 1 (G HR1) developed**

DESCRIPTION OF GRASS

CHARACTER	LANDRACE	G HR1
Leaf Colour	Green ,purple tinged sheath	Pale green speckled sheath
Growth Habit	Prostrate	Stoloniferous
Overall Appearance	Stemy, purple tinged internodes	Stemy, white tinged to light green internodes
Days to flower	90	90
Nematode resistance	Good	Excellent
Flower Colour	Light purple	Non-pigmented pale yellow

DESCRIPTION OF GRASS



GHR 1



Landrace

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APPEARANCE OF G HR1



Landrace



G HR1

APPEARANCE



HR1

GREENHOUSE EVALUATION

Materials and Methods

- **G HR1** evaluated against the **Landrace**
- Done in 20 L microplots
- Inoculated with 5 000 RKN juveniles per pot

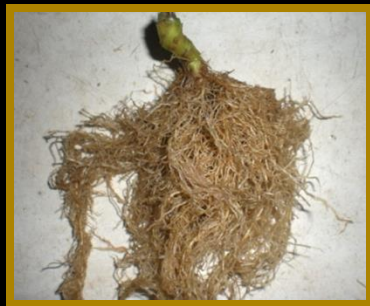
Measurements

- Mean No of eggs/root system
- Destructive sampling and root galling assessments done

Tobacco root galling scale



0



1



2



3



4



5



6



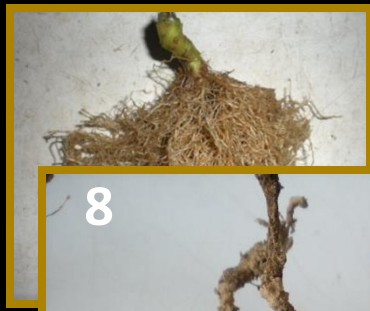
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Tobacco root galling scale



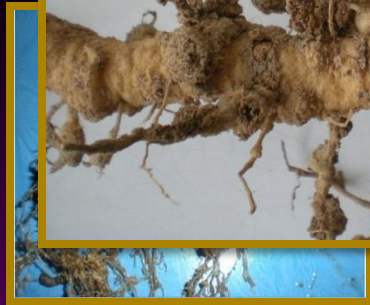
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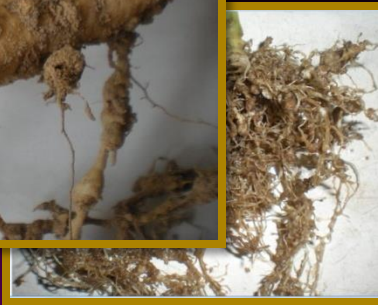
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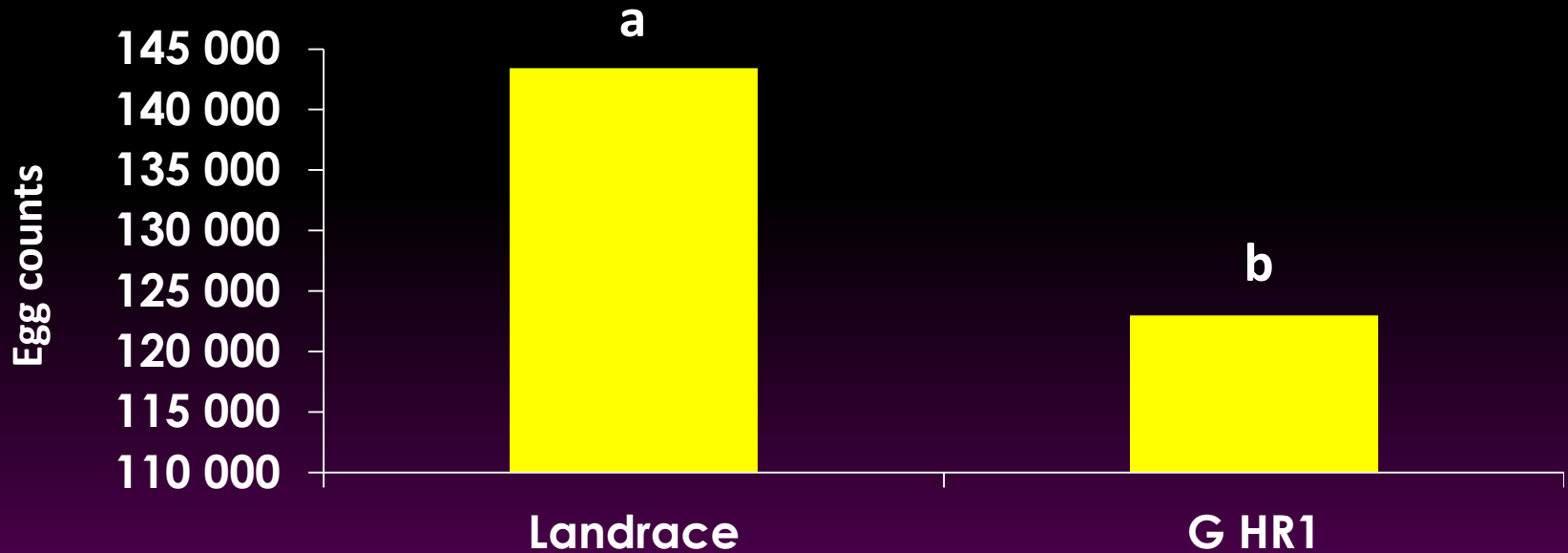


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RESULTS

MEAN NO OF EGGS / PLANT



Nematode Host status of G HR1 vs Landrace

CV	Egg count	Mean gall rating	% resistance
Landrace	143 417	1.1	65
G HR 1	122 989	0.53	93
F-PROBABILITY	0.02	0.04	0.01
SED	12 453	0.13	1.2
LSD	15345.1	0.32	20.3

RELATIVE % CHANGES IN NEMATODE POPULATIONS UNDER LANDRACE AND GHR1

Year/ Season Length of grass rotation	Landrace	% change in nematode population	G HR1	% change in nematode population
1	185 000	-	185 000	
2	143 417	-22.5	82 980	-55.1
3	82 980	-42.1	22 728	-72.6

VARIETY EVALUATION (FIELD TRIAL)

Materials and Methods

- The study was conducted at Kutsaga Research Station
- Agro Ecological Region IIA of Zimbabwe, coordinates of 17° 54' South and 31° 08'
- Elevation - 1496 m above sea level.
- Max and Min Temp. of 32°C and 18°C respectively.
- Average annual rainfall is 800 to 1000mm

Materials and Methods

Design: RCBD. 2 x 3 Factorial with 6 replications(3 buckets/plot)

Factor 1 (Rotation)

1. Landrace
2. G HR1

Factor 2 (Rotation time)

- 1 Year
- 2 Years
- 3 Years



Materials and Methods

- **KM 10 (Susceptible) and K RK26R (Tolerant)**
- **Planted nematode susceptible KM10 for one season**
- **Bioassays done to determine nematode population.**
- **Tobacco crops planted sequentially for 3 yrs**



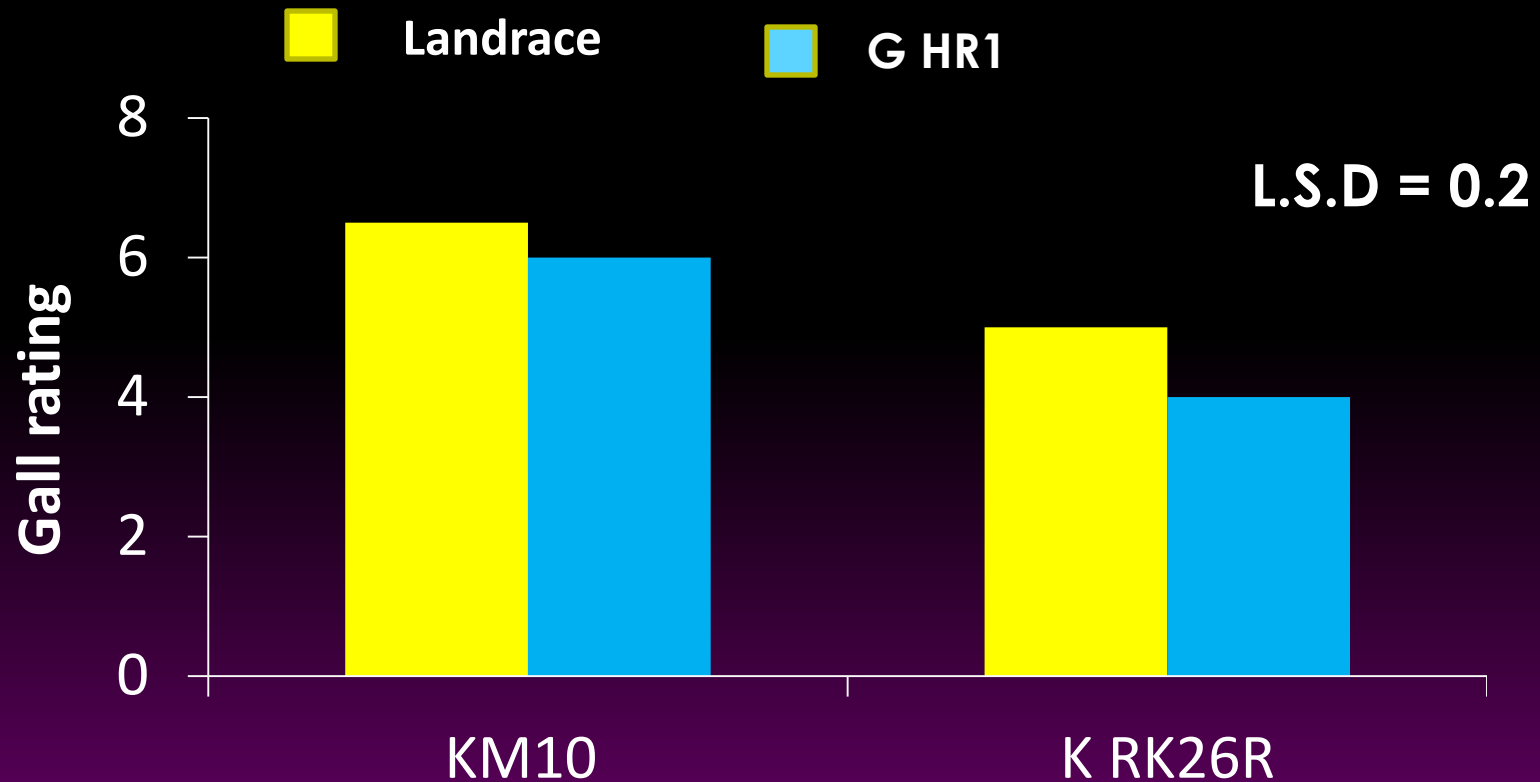


Data Analysis

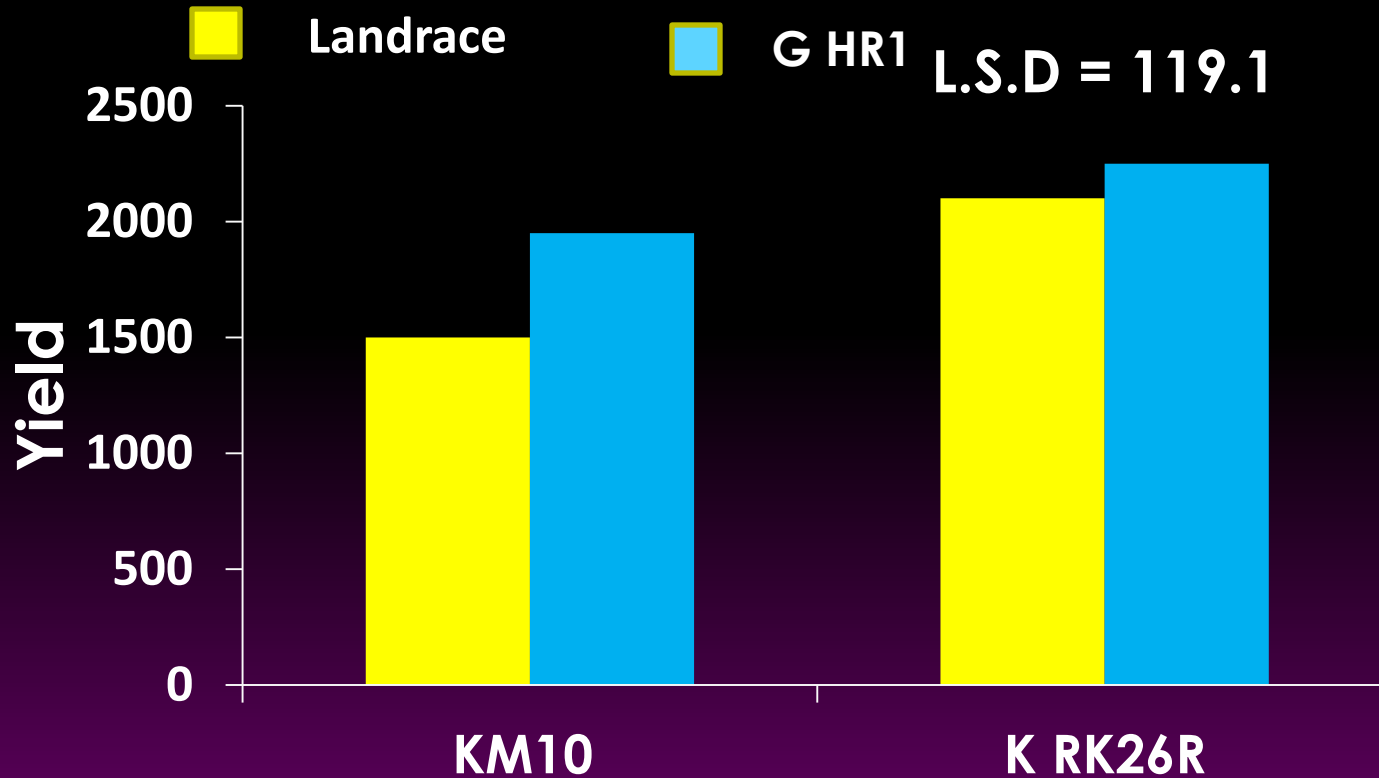
- ANOVA – Gentsart 18th edition
- LSD mean separation

Results

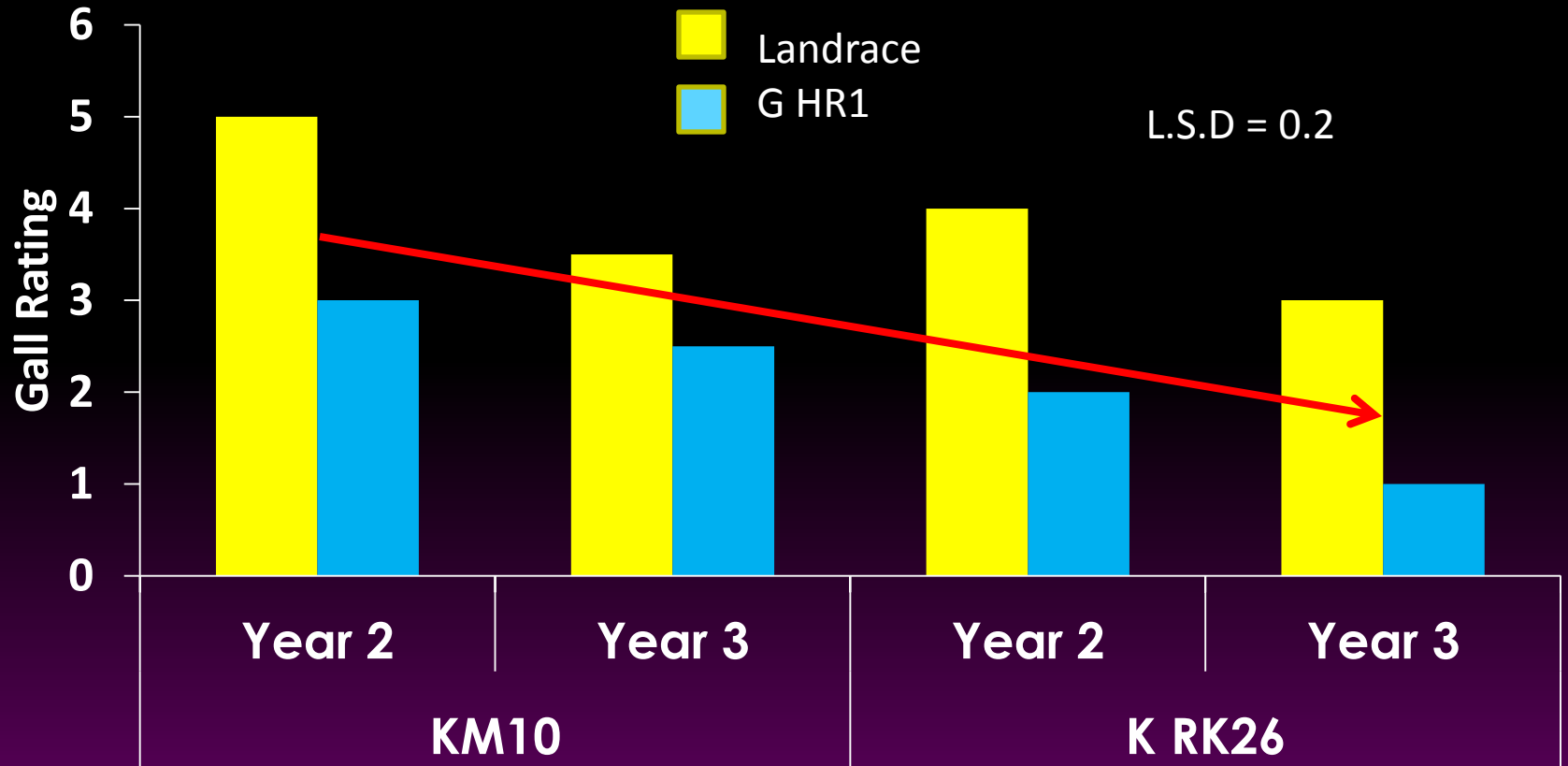
ROOT GALLING - AFTER 1 YEAR



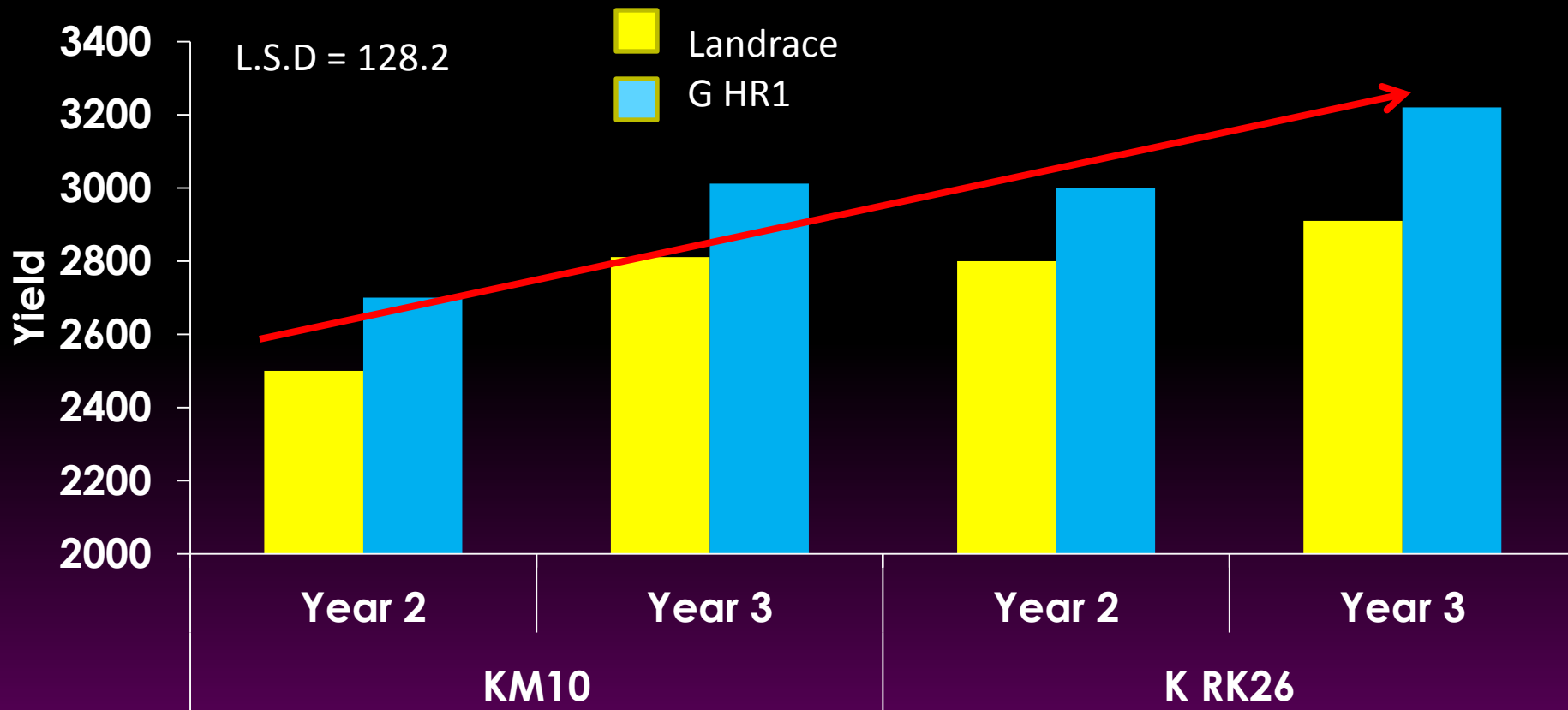
TOBACCO YIELD (KG/HA) – 1 YEAR



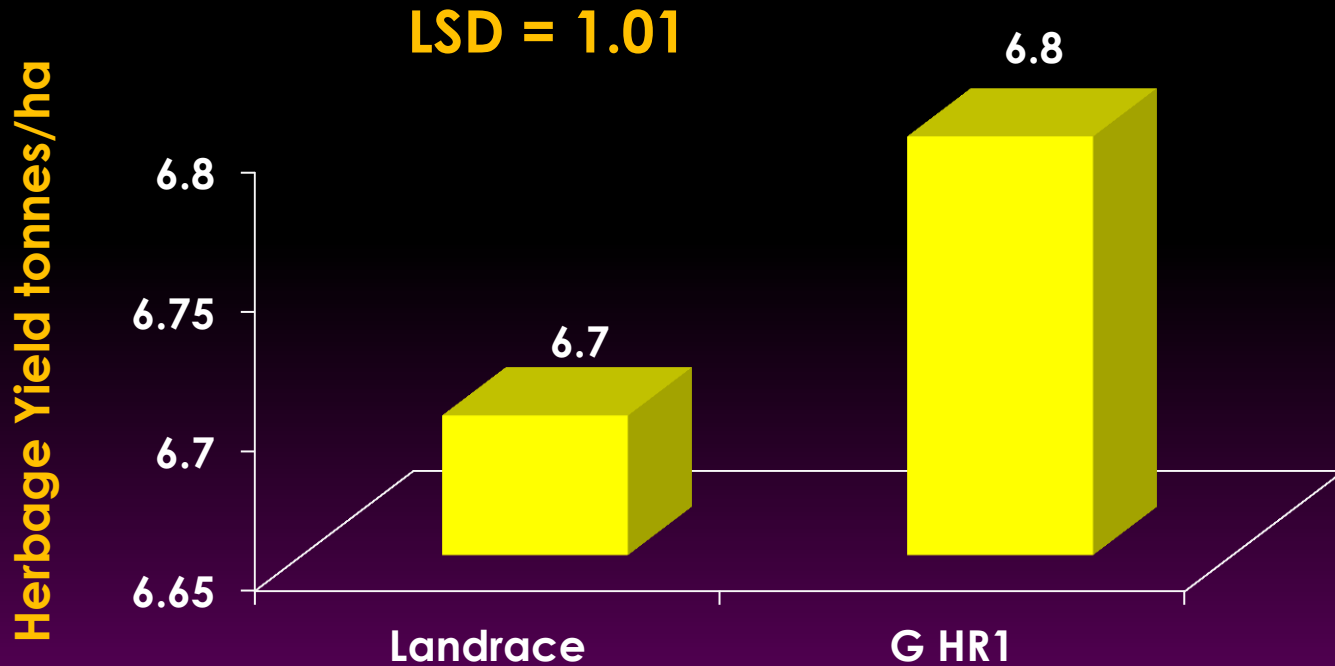
Comparative gall ratings (year 2 and 3)



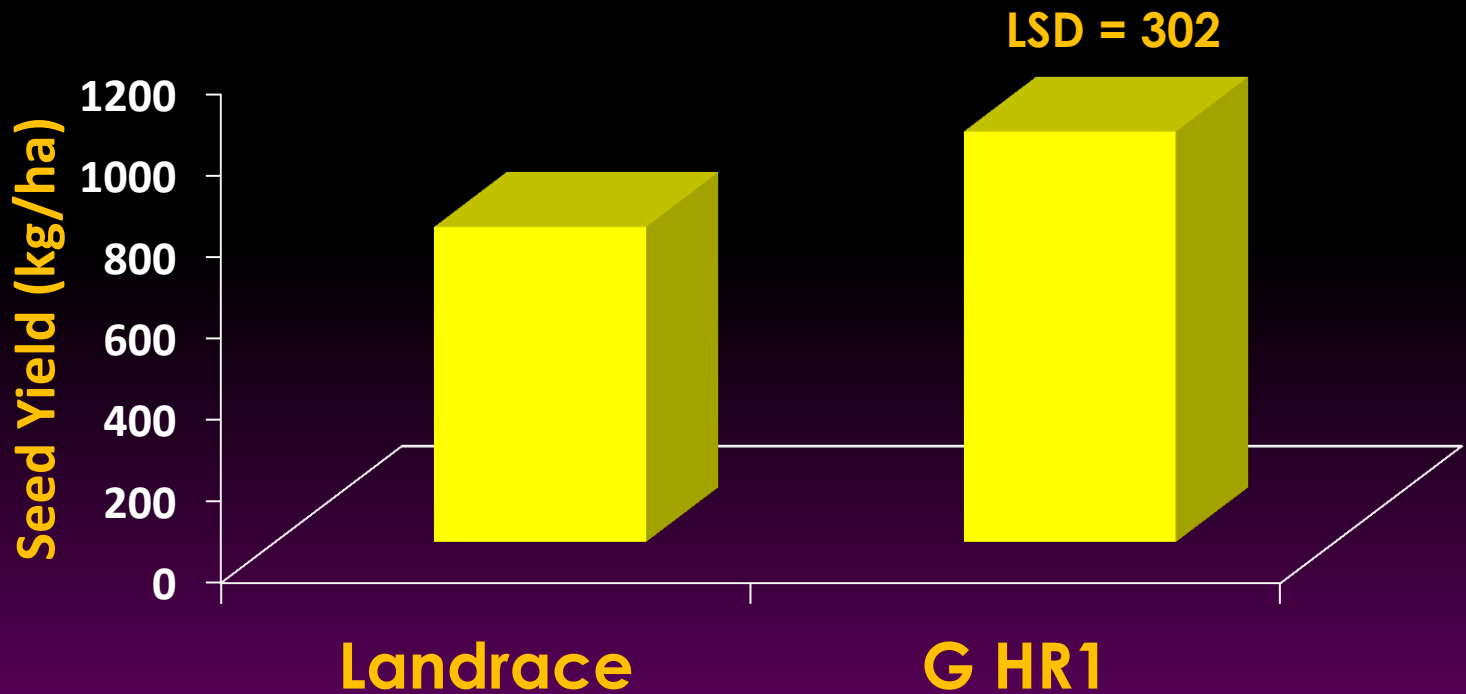
COMPARATIVE YIELD PERFORMANCE OF TOB. CV



HERBAGE YIELD (TONNES/HA)



SEED YIELD (KG/HA)



Conclusion

- **G HR1 suppressed root-knot nematodes better than the Landrace grass after a susceptible tobacco crop**
- **GHR1 in conjunction with a resistant cultivar provide better nematode control and yields**
- **GHR1 give better yields in a comparatively shorter rotation than Landrace**
- **G HR1 can be used under shortened rotations**

Recommendations

- It is therefore recommended that G HR1 be used in shorter rotations of two years since it has improved nematode suppression capacity.



Thank You

