PERFORMANCE AND ADAPTABILITY EVALUATION OF PVH 2275, PVH2254 AND PVH 2259 FOR REGISTRATION AND RELEASE IN TANZANIA

VARIETY DESCRIPTION

Name of Variety: PVH 2254

1 **(a) Name of crop: -** Tobacco

(b) Botanical name: - *Nicotianatabacum*

(c) Family name: *Solanaceae*

(d) Chromosome number: 48

(e) Mode of pollination: Cross-pollinated (male-sterile hybrid)

2 **(a) Proposed release name:** PVH2254

(b) Names under which tested: PVH2254

(c) Agency responsible for development: Profigen Brasil Tobacco Seed Ltd

(d) Cultivar pedigree: Male-sterile (MS PV2254XPP PV2254)

3 **(a) Proposed area of release:** All tobacco growing areas

(b) Proposed elevation: 500 – 1950 metres above sea level

(c) Agency responsible for breeder seed: Profigen Brasil Tobacco Seed Ltd

(d) Agency responsible for maintenance: Tobacco Research Institute of Tanzania (TORITA)

Points of merit:

- Resistant to root-knot Nematode (*Meloidogyne javanica),* TMV and Bacterial wilt
- Slow ripening of leaves
- Many number of leaves 24 leaves per plant
- Produces high quality tobacco

Name of Variety: PVH 2275

1 **(a) Name of crop:** Tobacco

(b) Botanical name: *Nicotianatabacum*

(c) Family name: *Solanaceae*

(d) Chromosome number: 48

(e) Mode of pollination: Cross-pollinated (male-sterile hybrid)

2 **(a) Proposed release name:** PVH 2275

(b) Names under which tested: PVH 2275

(c) Agency responsible for development: Profigen Brasil Tobacco Seed Ltd

(d) Cultivar pedigree: Male-sterile (MS PV 2275 X PP PV 2275)

3 **(a) Proposed area of release:** All tobacco growing areas

(b) Proposed elevation: 500 – 1950 metres above sea level

(c) Agency responsible for breeder seed: Profigen Brasil Tobacco Seed Ltd

(d) Agency responsible for maintenance: Tobacco Research Institute of Tanzania (TORITA)

3 **Points of merit:**

- Resistant to root-knot nematode (*Meloidogyne javanica),* TMV, Black Shank and Fusarium wilt
- Slow ripening of leaves

Name of Variety: PVH 2259

1 **(a) Name of crop:** Tobacco

(b) Botanical name: *Nicotianatabacum*

(c) Family name: *Solanaceae*

(d) Chromosome number: 48

(e) Mode of pollination: Cross-pollinated (male-sterile hybrid)

2 **(a) Proposed release name:** PVH 2259

(b) Names under which tested: PVH2259

(c) Agency responsible for development: Profigen Brasil Tobacco Seed Ltd

(d) Cultivar pedigree: Male-sterile (MS PV 2259 X PP PV 2259)

3 **(a) Proposed area of release:** All tobacco growing areas

(b) Proposed elevation: 500 – 1950 metres above sea level

(c) Agency responsible for breeder seed: Profigen Brasil Tobacco Seed Ltd

(d) Agency responsible for maintenance: Tobacco Research Institute of Tanzania (TORITA)

4. Points of merit:

- Resistant to root-knot nematode (*Meloidogyne javanica)*
- Slow ripening of leaves

1.0 INTRODUCTION

In 2014/2015 and 2015/2016 under advanced yield trial four introduced flue cured tobacco varieties PVH 2275, PVH2254, PVH 2259 and PVH 2310 from different origin and genetic back grounds were evaluated for disease resistance, yield and cured leaf quality in Tanzania at (TORITA) Tobacco Research Institute of Tanzania in Tabora region. The variety K326 was used as a control variety in the evaluation trials. After evaluation the PVH 2310 was discontinued as it was a fast ripening variety.

Diseases are among the constraints causing low yields and poor quality in tobacco crop. While agronomic practices can greatly improve yield and quality, the diseases problem is best tackled using varieties bred for resistance against specific diseases. Tanzania does not yet have effective hybrids of flue cured tobacco resistant to bacterial wilt (*Ralstonia solanacearum*) root-knot nematodes (*Meiloidogyne spp.*) and Angular leaf sport (*Pseudomonas syringae pv.tobaci*). Farmers spend a lot of money in buying chemicals in order to mitigate the destruction that comes with such genetic deficiencies in local hybrids.

The objective of the evaluation programme was to assess the adaptability and suitability of flue cured tobacco introductions the Tanzania environment against bacterial wilt, root knot nematodes, tobacco mosaic virus TMV and Angular leaf sport diseases with good quality and yield

1.1 PURPOSE FOR DEVELOPING VARIETIES:

Varieties were mainly developed for tobacco production to meet key characteristics of slow, medium and fast growing conditions particularly where alternaria (*Alternaria alternata*), black shank (*Phytophthora parasitica*), TMV, Angular leaf spot (*Pseudomonas syringae*) or root knot nematodes are a problem. They are moderately slow ripening hybrids and are of benefit to tobacco growers as a management tool as they allow them to maximize the use of their available land and facilities.

After Advanced Yield Trials (AYT) and on farm assessment, the results indicated that the three varieties PVH 2254, PVH 2259 and PVH 2275 were resistant to the rootknot nematodes *Meloidogyne javanica*, had higher were slower ripening and generally yielded higher than the commonly used variety K 326. TORITA therefore forwarded these three varieties to Tanzania Official Seed Certification Institute (TOSCI) for registration and release consideration.

1.2 METHODOLOGY:

Experimental design was a Randomized Complete Block Design (RCBD) with 4 replications. The plot size was 17m x 2.4m, spacing used was 120cm between ridges and 50cm between plants within the ridges. In farmer's assessment, farmers were involved in PVH varieties evaluation using farmer's knowledge and criteria. With the exception of all disease and root knot assessments, all data was subjected to analysis of variance (ANOVA) and means were separated using Duncan multiple range test (DMRT).

The three (3) varieties namely PVH 2254, PVH 2259 and PVH 2275 were evaluated in Urambo Seed Farm (Urambo District), Tumbi Tobacco Research Institute (Tabora) and Mtanila – Chunya for the 2014/15 and 2015/16 crop seasons. These varieties were compared with K 326 that is commonly used by farmers.

The following parameters were used for the assessment

- Saleable yield
- High grade index
- Leaf area
- Root knot nematode gall count
- Reaping interval
- Disease scores

1.3 Saleable yield

This is the dry leaf weight obtained after curing and graded which has been brought to the market. It is measured as kilogram dry weight per hectare.

1.4 Grade index

This is an indicator of the measured quality of cured leaf as determined by the classification of the grades; the higher the grade index the higher the quality of the leaf.

$$\text{Grade index (GI)} = \frac{\text{Grade value X graded tobacco weight}}{\text{Barn dry weight of leaves}}$$

1.5 Root knot nematode galls assessment

This is obtained from assessing the severity of galls in the root structure of the plant and ranges from 0 (no galls) to 8 (severe galling).

1.6 Disease scores

The following diseases were scored, TMV, Root-knot nematode *Meloidogyne javanica*, Bacterial wilt and angular leaf spot (*Pseudomonas syringae*).

1.0 ADVANCED YIELD TRIAL (AYT)

1.1 Results and discussion

1.2 Saleable Yield (kg/ha) for the year 2014/2015-2015/2016

Results for the two seasons (2014-2015and 2015-2016, shows that, the highest cured leaf yield was produced by the variety PVH 2254 which gave an average of 2596.096kg/ha for two consecutive seasons, followed by the variety PVH 2259 which gave 2262.963 kg/ha. The lowest yield was from K326 (control) which gave the average yield of 1376.927kg/ha. Research results showed that there was significant difference between the variety K 326 control and the rest of the varieties at $P < 0.05$.

Table 1: Saleable Yield (kg/ha) for the year 2014/2015-2015/2016

	2014-2015			2015 – 016		
Variety	**Urambo**	**Tumbi**	**Chunya**	**Urambo**	**Tumbi**	**Chunya**
PVH2254	2172.577 a	3106.44a	1877.205a	2068.629a	4199.28a	2152.445a
PVH2259	1680.325 b	2589.71b	1873.161a	2013.617a	3526.598ab	1894.362b
PVH2275	1248.163 c	2170.03c	1687.376b	1652.825b	3193.015b	1728.798c
K 326	957.023 d	2159.739c	938.602c	1126.464c	2271.446c	808.288d
Mean	1514.52	2506.484	1594.086	1715	3297.58	1645.973
Lsd	249.989	408.782	174.056	178.091	771.48	128.884
cv%	10.319	10.195	6.82	6.490	14.626	4.895

Table 2: Leaf area (2014/15 and 2015/16seasons) in cm^2

	2014 – 015			2015- 016		
Variety	**Urambo**	**Tumbi**	**Chunya**	**Urambo**	**Tumbi**	**Chunya**
PVH2254	727.092a	1245.121a	1861.613a	439.63	798.43	1468.04a
PVH2259	675.316ab	813.825b	777.930b	377.099	706.406	944.277b
PVH2275	639.511ab	807.054b	769.061b	375.02	794.13	842.267b
K326	596.890b	768.188b	600.45b	358.86	762.47	751.536b
Mean	659.702	908.547	1002.264	387.655	771.01	1001.531
Lsd	102.108	250.644	183.86	104.702	169.100	326.192
Cv%	9.676	17.246	11.468	16.885	14.560	20.361

Monitoring the distribution and changes of Leaf Area is important for assessing growth and vigor of tobacco varieties. It is fundamentally important as a parameter in land-

surface processes and parameterizations in climate models. This variable represents the amount of leaf material in ecosystems and controls the links between biosphere and atmosphere through various processes such as photosynthesis, respiration, transpiration and rain interception. The research findings shows that, the variety PVH 2254 gave the highest leaf area of 1089.988 cm^2 the reason for the PVH 2254 to give the highest leaf area was the unique characteristics of having many and broad leaves compared to other varieties as the PVH 2254 was toped up to 24 leaves while the rest varieties were topes at the average of 18 leaves , followed by PVH 2259 which gave 715.808cm^2 ,the lowest leaf area was from the variety K 326 which was 639.732cm^2. Results show that, there was a significant difference among the varieties at $P < 0.05$

Table 3: Assessment of Root knot Nematode (*Meloidogyne javanica*) Infection

	2014– 15			2015– 16		
Variety	**Urambo**	**Tumbi**	**Chunya**	**Urambo**	**Tumbi**	**Chunya**
PVH2254	0	0	0	0	0	0
PVH2259	0	0	0	0	0	0
PVH2275	0	0	0	0	0	0
K 326	4	5	3	3	4	3

Rootknot Assessment (scores of 0 – 8):

Class	**Degree of Galling**
0	Free of galls
1	Trace infection, less than 5 galls
2	Very slight, 5 to 25 galls
3	Slight, 26 to 100 galls
4	Moderate, numerous galls, mostly discrete
5	Moderate, numerous galls, many coalesced
6	Heavy, numerous galls, mostly coalesced, root growth slightly retarded
7	Very heavy, mass invasion, slight root growth
8	extremely heavy, mass invasion, no root development

Table 4: Assessment of Frogeye Infection

	2014– 15			2015 – 16		
Variety	**Urambo**	**Tumbi**	**Chunya**	**Urambo**	**Tumbi**	**Chunya**
PVH2254	1	1	1	1	1	1
PVH2259	1	1	1	1	1	1
PVH2275	1	1	1	1	1	1
K 326	3	2	3	2	3	2

Frogeye Assessment (scores of 0-5):

1 = No symptoms
2 = Faint chlorosis
3 = Distinct chlorotic spots
4 = Tiny lesions
5 = Extensive necrosis

Table 5: Assessment of Angular Leaf Spot (ALS) Infection

Variety	2014– 15			2015 – 16		
	Urambo	Tumbi	Chunya	Urambo	Tumbi	Chunya
PVH2254	1	1	1	1	1	1
PVH2259	1	1	1	1	1	1
PVH2275	1	1	1	1	1	1
K 326	3	2	2	3	4	2

Angular Leaf Spot (ALS) Assessment (scores of 1-5):

1 = No symptoms
2 = Faint chlorosis (can define point of inoculation)
3 = Distinct chlorotic spots
4 = Tiny lesions (ALS just starting)
5 = Extensive necrosi

6. Table: Assessment of Tobacco Mosaic Virus (TMV) Infection

Variety	2014 – 15			2015 – 16		
	Urambo	Tumbi	Chunya	Urambo	Tumbi	Chunya
PVH2254	0	0	0	0	0	0
PVH2259	0	0	0	0	0	0
PVH2275	0	0	0	0	0	0
K 326	3	2	2	4	3	2

Tobacco Mosaic Virus (scores of 0 – 7):

0 = Nil
1 = Trace
2 = Slight
3 = Light
4 = Moderate
5 = Fairly severe
6 = Severe
7 = Very severe

Compared with the control K 326, the three PVH varieties had resistance to angular leaf spot, Tobacco Mosaic Virus, Frog eye and the root knot nematode.

1.4 Grade index

Grade index is the ratio of the value of tobacco in the market to the dry barn weight, that is, the weight of tobacco after curing process before grading. The good quality of tobacco is therefore justified by having the highest grade index and the low quality tobacco fetches low price and account to the low grade index (GI).

Results (Table 7) show that the highest grade index was produced by the variety PVH 2254 which in average was 2.686 $ followed by the variety PVH 2259 which produced the average of 1.296$. The lowest grade index was produced by the variety K326 (control) which was in average 0.689$.There was a significance difference among the tested varieties at p>0.05.

Table 1: GRADE INDEX for seasons 2014-2015 and 2015-2016 for three sites

Variety	2014 – 2015			2015 – 2016		
	Urambo	Tumbi	Chunya	Urambo	Tumbi	Chunya
PVH2254	1.480a	2.806a	3.644a	2.571a	2.721a	2.899a
PVH2259	1.466a	1.331b	1.238b	1.527b	1.165b	1.053b
PVH2275	0.90b	0.948c	0.863c	1.212bc	1.118b	0.862c
K 326	0.605b	0.910c	0.547d	1.003c	0.606c	0.467d
Mean	1.113	1.500	1.573	1.578	1.403	1.320
L.s.d	0.477	0.161	0.228	0.323	0.199	0.137
c.v%	26.78	6.743	9.071	12.82	8.866	6.511

ON-FARM ASSESSMENT REPORT 2015-2016

1.0 INTRODUCTION:

To ensure that technologies released address end users' needs farmers must be involved in technology development and evaluation/assessment. Farmers' participation in the evaluation will ensure faster awareness, acceptance and adoption of the released technologies. Farmers use their own Indigenous Knowledge and criteria to assess technologies and in most cases their criteria are not the same as the researchers' criteria. For any variety/technology acceptance or rejection it is their criteria, which is used to assess it at the end of the season. It is therefore very important to know farmers criteria in

order to develop technologies, which will meet their needs and also be adopted faster by them.

Based on the abovementioned reasons some Farmer Managed Farmer Implemented (FMFI) trials were conducted to assess the performance of elite varieties in their own environments and socio-economic circumstances in order to determine their criteria for preference as well as preferred varieties.

1.1 GENERAL OBJECTIVE

The general objective was to involve farmers in PVH varieties evaluation using farmer's knowledge and criteria

1.1 OBJECTIVES

The specific objectives are:

1. To introduce and evaluate potential PVH tobacco varieties under farmers' conditions
2. To ensure participation of small /medium scale tobacco growing farmers in the evaluation of different PVH tobacco varieties under their own management and socio-economic circumstances
3. To understand farmers' criteria for preference of PVH tobacco varieties
4. To identify PVH tobacco varieties preferred by farmers
5. To provide feedback to variety development agents, leaf technicians and primary societies on the quality and performance of the tested tobacco varieties.
6. To increase tobacco production and quality to not only growers but also to customers preferences.

1.2 METHODOLOGY

The Tobacco Research Institute of Tanzania (TORITA) in collaboration with extension staff and farmers in Chunya, District in the Southern highlands in the year 2014/2015-2015/2016 conducted on-farm trials to assess three new PVH tobacco varieties namely PVH 2254, PVH2259, PVH 2275 compared to K 326 as the check variety. The criteria for farmers' selection to participate in the evaluation were land availability, accessibility to the sites, farmers' interest to participate in the trial and the willingness to welcome other farmers to the field to learn and share experiences about the varieties.

The spacing used was 120 cm x 50 cm. The trial was Farmer Managed Farmer Implemented. Data collected was number of plants survived, number of leaves reaped per plant, leaf body, size and texture at field, cured leaf colour and yield per area. An ANOVA was performed for the data collected and a Duncan Multiple Range Test (DMRT) was used to separate the means. Farmers' assessment was done using absolute,

matrix and pair wise rankings. Farmers' assessment report and yield potential data are presented in the report

1.3 RESULTS AND DISCUSSION

Farmers' assessment session was conducted at Mtanila village Chunya District on the 16 April, 2017. The session was attended by a total of thirty (30) farmers and two (2) leaf technicians (15males & 15 Females). The farmers who participated had direct exposure to see the PVH varieties through the on-farm trials and also with long time-experience and skills in assessing tobacco varieties performances. Farmers were first asked to observe the varieties in the field before assessing them. The varieties were evaluated using absolute, matrix and pair wise rankings.

1.3.1 Factors considered to the introduction of the new tobacco varieties:

Farmers were asked as what are the main factors to be considered on the introduction of these new varieties in this country. Table 1 summarizes the factors mentioned by these farmers.

Table 8: Main factors prioritized by the tobacco growers of Southern highlands of Tanzania

No	Factors considered	Rank
1	High yield	**2**
2	Cured leaf (colour)	**1**
3	Ripening rate	**3**
4	Disease tolerance	**5**
5	Leaf body	**6**
6	Number of days on curing	**4**
7	Drought tolerance	**7**

1.3.2 Cured leaf:

Mainly involve the colour if it is orange, rich lemon or lemon but also it is associated with either bodied leaf or thin and texture if it is oily or brittle.

1.3.3 High-yielding:

The yield per acre/hectare also was the second factor considered by these farmers
The varieties establishes well from beginning such that deaths were less such that
Crop looks very uniform and makes easy on reaping by its position

1.3.4 Tolerance to diseases

The Rootknot nematode *M. javanica* is a major problem in Tanzania; compared with the susceptible control K 326, the PVH varieties are resistant to the pest.

1.3.5 Ripening rate

Farmers were interested in slow ripening varieties that will give them time to cure it properly. Fast ripening varieties result in over packing of barns and significant loss of leaf.

1.3.6 Less days on curing

Very few farmers who have enough curing capacity, therefore they were much eager to see how many days will take to cure the leaf in a barn (turn round) as the reason of dropping the variety PVH 2310

1.3.7 Leaf size & body

Farmers were interested to see the broad, bodied leaves that they believe will give back more money rather than thin bodied and narrow tobacco leaves.

1.3.8 Drought resistance

With prolonged drought farmers prefer varieties that are more tolerant of drought.

1.3.9 Absolute ranking:

The absolute ranking of the PVH tobacco varieties is shown in Table 2.

Table 9: Absolute ranking of PVH tobacco varieties in Southern highlands Tanzania in 2016

No		Rank
1	PVH2254	1
2	PVH2259	3
3	PVH2275	2
4	K 326	4

PVH 2254, ranked number one followed by PVH 2275 and PVH 2259 was ranked third were by K326 (check) was ranked the fourth

1.4 PVH TOBACCO VARIETIES CHARACTERISTICS

Farmers listed the characteristics of each PVH tobacco variety as observed in the field using experience they have as indicated below in Table 3

Table 10: Farmers' description of the evaluated DDV tobacco varieties

PVH 2254	**PVH 2275**
• Slow maturity compared to K 326 • Drought tolerant • High yield • Broad leaf • Mottled leaf • Resistant to alternaria and angular leaf spot • It has better lamina to stem ratio • Medium plant height • It has rich lemon cured leaf • Resistant to root knot Nematodes • Resistant to Tobacco Mosaic Virus	• Slightly taller than K 326 • Slower ripening compared to K326 • Fairly drought tolerant • It is not brittle • Very broad leaf • Strong stalk • Mottled leaf • Resistant to alternaria and angular leaf spot • Rich lemon to orange cured leaf • Resistant to rootknot nematodes
PVH 2259 Slow ripening Lemon to deep lemon in colour. Mottled leaf It has higher lamina percentage .Strong stem . Resistant to alternaria and angular leaf spot. Resistant to root not nematodes. It is a medium to tall plant Fairly drought tolerant .High yielding	

1.4.1 Criteria used by farmers to select PVH tobacco varieties

Farmers mentioned the criteria they use to select PVH tobacco varieties as shown in

Table 11: Farmers' criteria in selection of PVH tobacco variety in Southern highlands Zone in 2017

No	**Criteria**	**Rank**
1	High yield	2
2	Cured leaf (colour)	1
3	Ripening rate	3
4	Disease tolerance	5
5	Leaf body & expansion	6
6	Number of days in curing	4
7	Drought tolerance	7

The most important farmers' criteria for PVH tobacco variety preference were colour to a cured leaf, ripening rate/interval, high yield, leaf expansion, strong stalk/plant height, disease tolerance, and drought tolerance.
The 7 criterion were used in the next step of matrix ranking where these criterions were scored for each varieties tested.

1.4.2 Matrix ranking

Farmers conducted a matrix ranking of the three PVH tobacco varieties using these most important criteria as indicated in Table 5.

Table 12: Matrix ranking of PVH tobacco varieties in Southern Highlands in 2017

	PVH 2254	**PVH 2275**	PVH2259	K326	Total	Rank
Drought tolerance	**5**	4	4	3	16	5
Ripening rate	**4**	**3**	3	3	13	4
High yield	**5**	**4**	**4**	3	16	5
Cured leaf (colour)	**5**	**3**	**4**	**3**	**15**	**4**
Disease tolerance	**4**	**4**	**4**	**3**	**15**	**4**
Total	**23**	**18**	**19**	**15**	**18**	
Rank	**1**	**3**	**2**	**4**		

Key for scores: 1 = Poor, 2 = Satisfactory, 3 = Average, 4 = Good and 5 = Excellent

Variety PVH 2254 was ranked "excellent" on drought tolerant, high yield, and leaf colour. PVH2275 scored "average" on high yielding and disease tolerance. PVH 2259 had "Good" ranking in cured leaf, high, rough tolerant and disease tolerant. While K326 scored "average" on all the characteristics .Across all criteria PVH 2254 was ranked as 1 and PVH2275 ranked number 2 and followed by PVH 2259 and last K326 in matrix and pair wise ranking. Based on the criteria used, PVH 2254 and PVH 2275 were the most preferred variety followed by PVH 2259 respectively.

1.4.3 Pair wise ranking

Farmers did a pair wise ranking as shown in the table below.

Table 13: Pair wise ranking of PVH tobacco varieties in Southern highlands

	PVH 2254	**PVH 2275**	**PVH 2259**	**K 326**	**Total**	**Rank**
PVH2254	**xxxxx**	PVH 2254	PVH 2254	PVH 2254	**3**	**1**
PVH2275		**xxxx**	PVH 2275	PVH 2275	**2**	**2**
PVH2259			**xxx**	PVH 2259	**1**	**3**
K 326				x	**0**	**4**

In pair wise ranking, PVH 2254 ranked number one followed by PVH 2275 as second in both pair wise and Matrix ranking. PVH 2259 was ranked third in pair wise and in matrix. K326 was ranked fourth and last in both pair wise and matrix rankings. This indicates that varieties PVH 2254 and PVH 2259 have the most preferred criteria by farmers compared to their commercial checks.

Farmers' comments/suggestions/requests:

Finally, tobacco growers were given a room to give their suggestions. Below in Table 8 were such findings.

Table 14: Comment/suggestions/request

No	Comments/suggestions/requests	Rank
1	Nursery and field inputs to be delivered prior to rain fall	1
2	Farmers to get frequent seminars especially on tobacco grades	3
3	Research on tobacco cost of production should be done every season	4
4	Any new variety to be introduced they should be informed/involved	2
5	Tobacco Marketing to be done as quick as possible before rain on set for the next season	5

Farmers proposed nursery and field inputs to be distributed to them before in time and once the new variety among the tested varieties is released, and then the released variety should be supplied to them timely and in satisfactory amount. However suggestion was given to conduct tobacco marketing prior to the following season

1.5. CONCLUSION

- Using the above tobacco characteristics such as leaf colour, ripening rate, high yield and tolerance to diseases, drought tolerance, leaf colour, ripening rate, high yielding, rootknot resistance and leaf expansion, farmers were very interested in the PVH varieties compared to the check variety K326.

As PVH 2254 was mostly preferred variety by the farmers in all the rankings followed by the other two PVH varieties, PVH varieties also had the highest grades as well as yields compared to the check, it is therefore strongly recommended by TORITA to be considered for release.

NATIONAL PERFORMANCE TRIAL (NPT)

1.0 INTRODUCTION

TORITA applied for NPT for the verification of three (3) flue-cured hybrid tobacco candidate varieties PVH 2254, PVH2275 and PVH 2259. The merits of these varieties are resistance to the root-knot nematode (*Meloidogyne javanica),* alternaria and angular leaf spot, higher leaf potentials, resistant to Tobacco Mosaic Virus and slow ripening of leaves. The three candidate varieties were compared to the commercial check variety K 326.

1.1 MATERIALS AND METHODS

The trial was planted at three (3) locations, Urambo, Tabora (Tumbi) and Chunya. The candidate varieties were PVH 2254; PVH 2259 and PVH 2275 were tested against the variety K 326 commonly grown by tobacco growers. The experimental design used was randomized complete block design with four replications. The plot size was 2.4 m x 17 m with two ridges with spacing of 50 cm between plants and 120cm between ridges. Data collected included dry leaf weight (kg/ha), root-knot nematode, alternaria, frogeye and tobacco mosaic virus (TMV) scores.

1.2 RESULTS AND DISCUSSION

1.3 Saleable Yield (kg/ha)

Urambo: At this site yields were statistically different at P≤0.05 among varieties. The candidate variety PVH 2259 (1876.204 kg ha^{-1}) produced higher leaf yield followed by PVH 2254(1875.159 kg ha^{-1}). The other candidate PVH 2275 (940kg ha^{-1}) was fourth after the check K326 (1688.375 kg ha^{-1}) which ranked 3rd.

Tumbi: At Tumbi yield levels were significantly different (P≤0.05).The candidate varieties PVH 2254 (3102.45 kg ha^{-1}), PVH 2259 (2586 kg ha^{-1}) and PVH 2275 (2171.03kg ha^{-1}) all out yielded the standard check K326 (2157.737 kg ha^{-1}) which was the last with the lowest leaf yield.

Chunya: At Chunya, yield levels were not significantly different (P≤0.05). The candidate varieties PVH 2254 had the leaf weigh of (2943.015 kg) followed by PVH 2259 (2932 kg ha^{-1}) and PVH 2275(2917.280 kg ha^{-1}). All the three candidate varieties out yielded the standard check K326 (2896.446kg ha^{-1}) which ranked 4th.

Table 15: Saleable Yield (kg/ha) 2016/17 season

No	Variety	2016 -2017		
		Urambo	Tumbi	Chunya
1	PVH2254	1875.159a	3102.45a	2943.015
2	PVH2259	1876.204a	2586.71b	2932.598
3	PVH2275	940.61c	2171.03c	2917.280
4	K 326	1688.375b	2157.737c	2896.446
	Mean	1593.076	2504.473	2922.335
	Lsd	173.055	407.771	1195.345ns
	cv%	6.790	9.99	25.57

1.4 GRADE INDEX

Results (Table 16) show that the highest grade index was produced by the variety PVH 2254 which in average was 2.32 $ followed by the variety PVH 2259 which produced the average of 1.541$. The lowest grade index was produced by the variety K326 (control) which was in average 0.77$, and hence significance difference among the tested varieties at p>0.05

Table 16: Grade index for the 2016 -2017 for Urambo, Tabora and Chunya districts

No	Variety	2016 -2017		
		Urambo	Tumbi	Chunya
1	PVH2254	2.58a	2.89a	1.51a
2	PVH2259	1.61b	1.544b	1.47a
3	PVH2275	1.41bc	1.226c	0.89b
4	K 326	0.99c	0.73d	0.59b
	Mean	1.591	1.597	1.14
	L.s.d	0.333	0.226	0.56
	c.v%	11.93	8.88	25.98 ha^{-1}

1.5 LEAF AREA

The candidate variety PVH 2254 had the highest average of leaf area of 1245.537 cm^2 as in the three sites, followed by PVH 2259 with 848.138cm^2.The lowest leaf area was from the standard check variety K 326 which was 730.8567cm2. Results show that, leaf area was significantly different among the varieties at P < 0.05

Table 17: Leaf area for the 2016-2017 for Urambo, Tabora and Chunya district

No	Variety	2016 - 2017		
		Urambo	Tumbi	Chunya

1	PVH2254	1470.11a	1022.201a	1244.3a
2	PVH2259	946.3b	785.384b	812.73b
3	PVH2275	844.33b	784.840b	808.053b
4	K 326	752.54b	669.830b	770.200b
	Mean	1002.55	815.56	908.55
	Lsd	328.11	183.980	251.00
	cv%	21.40	14.1028	17.250

When leaf weight was averaged across the three sites (Table 18), the highest cured leaf yield was produced by the variety PVH 2254 which gave an average of 2640.208 kg ha^{-1} followed by the variety PVH 2259 (2465.171 kg ha^{-1}) and PVH 2275 (2258.895 kg ha^{-1}) ranked 3rd. The standard check K326 had the lowest leaf yield (1998.264 kg ha^{-1}).

18. Average leaf yield for the three sites

		2016 -2017				
No	**Variety**	**Urambo**	**Tumbi**	**Chunya**	**Average**	**Rank**
1	PVH2254	1875.204a	3102.45a	2943.015	2640.208	1
2	PVH2259	1876.156a	2586.71b	2932.598	2465.171	2
3	PVH2275	940.61	2171.03c	2917.280	2258.895	3
4	K 326	1688.375b	2157.737c	2896.446	1998.264	4
	Mean	1593.076	2504.473	2922.335		
	Lsd	173.055	407.771	1195.345ns		
	cv%	6.790	9.990	25.57		