

# **TESTING MANUAL**

## **FOR**

### **REGISTRATION OF TOBACCO**

#### **VARIETIES/HYBRIDS**

**Technical Working Group for Tobacco**  
National Seed Industry Council  
2015

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**NATIONAL SEED INDUSTRY COUNCIL**  
**TECHNICAL WORKING GROUP FOR TOBACCO**  
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# **REGISTRATION OF TOBACCO VARIETIES/HYBRIDS**

## **PART I. POLICIES AND GUIDELINES**

### **A. RATIONALE**

Tobacco buyers/traders are constantly on the look-out for varieties that satisfy their clients, i.e. the cigarette manufacturers, smokers and all other users of the tobacco leaf. More often than not, the latter have their preferences, specifically those varieties and/or hybrids, which have been developed by established tobacco seed companies in other countries. These varieties and/or hybrids are reportedly a product of intensive evaluation, in consonance with the requirements of the ultimate users of the tobacco leaf. Moreover, these varieties/hybrids are developed for specific purposes in the end product, the cigar/cigarette, or to address specific crop production problems.

Thus, specific tobacco varieties/hybrids are introduced into the country by private companies in an attempt to satisfy specific market demands. To safeguard the prospective farmer-cooperators when these varieties/hybrids are promoted for wide-scale production, and give the concerned companies propriety rights, if applicable, over these introduced tobacco materials in accordance with the provisions of the Republic Act 7308, otherwise known as the Seed Industry Development Act, it is imperative that the private companies follow certain guidelines, when these are initially tested for adaptability in farmers' fields before these varieties/hybrids are registered with National Seed Industry council (NSIC).

### **B. OBJECTIVES**

1. To test and evaluate the adaptability and performance of newly introduced varieties/hybrids of tobacco as grown for a specific purpose;
2. To register a newly introduced varieties/hybrids of tobacco grown for a specific purpose with the National Seed Industry Council through the Tobacco Technical Working Group.

### **C. ENTITIES CONCERNED**

All entities responsible for introducing new varieties/hybrids to satisfy the needs of their buyers shall abide by these guidelines. These entities

include, among others, farmers, tobacco leaf buyers/traders (local and worldwide), cigarette manufacturers, tobacco leaf processors, etc.

#### **D. ORGANIZATION AND FUNCTIONS**

The adaptability trials shall be implemented by the agency/company introducing the tobacco varieties/hybrids in cooperation with their farmer-cooperators and in coordination with the Tobacco Technical Working Group (TTWG) of the NSIC. This is to ensure that the trials shall be according to the prescribed implementation strategies and sound statistical considerations and in order to generate the information needed in registering the variety/hybrid.

Actual visitation of the adaptability trials shall be conducted by the NSIC-TTWG at least once during the tobacco season and for at least two (2) seasons. The data generated shall be presented to the NSIC-TTWG for evaluation and if this merits the endorsement of the materials for registration, the necessary form/s shall be prepared accordingly. This will be endorsed by the NSIC-TTWG Chair for the group to the NSIC for approval.

**1. Testing of Varieties/Hybrids.** It is a general requirement that the varieties/hybrids shall be evaluated for at least two seasons in replicated trials in farmers' fields. The following information should be available from the original source of the seeds:

- a. Tobacco type
- b. Place of origin
- c. Pedigree (optional)
- d. Days to first priming
- e. Plant/stalk height
- f. Number and size of leaves
- g. Yield per hectare
- h. Grade index
- i. % Nicotine
- j. % Reducing sugars (optional)
- k. Reaction to pests

As the variety/hybrids shall be evaluated on account of its own merits and/or for a specific purpose, a check variety will be required. In the case of varieties or hybrids which have not been grown locally before, the best NSIC registered variety of the same type/subtype shall be used as check variety. For a hybrid to be registered, it should be able to surpass the inbred yield and the percentage of high quality leaves by 10% in both testing seasons/years.

**2. Number of Test Locations.** The varieties/hybrids shall be tested in a minimum number of locations per province/area as summarized in Table I. Periodic visits to the testing sites will be made by selected members of the TTWG.

Table 1. Required Number of Environments For NSIC Registration of Tobacco Variety/Hybrid.

Type of Tobacco	Sub-type	Total Number of Environments
Virginia		Two seasons in at least four (4) locations or a total of eight (8) environments
Burley		-do-
Native	Cigar-filler	-do-
	Batek/Chewing	Two seasons in at least three (3) locations or a total of six (6) environments.
	Snuff	Two seasons in at least three (3) locations or a total of six (6) environments
	Cigar-Wrapper	Two seasons in at least three (3) locations or a total of six (6) environments

**3. Suggested Testing Sites.** The variety/hybrid shall be recommended to the NSIC for registration provided the minimum number of environments in conducting the trials has been satisfied. The suggested locations are in Table 2. The location can be changed depending on the choice of the company introducing the variety, however, it should be in an area where the majority of the tobacco type/subtype to which that variety belongs, is being grown.

Table 2. Testing Sites of Tobacco/Varieties/Hybrids for NSIC Registration.

Type of Tobacco	Sub-type	Required Preliminary Information	Testing Location per Season	
			Required Number	Province
Virginia		Tobacco type Place of origin Pedigree (optional) Days to first priming Plant and stalk height Number and size of leaves Yield per hectare Grade index % Nicotine % Reducing sugars (optional) Reaction to pests	4 in at least two provinces	La Union Ilocos Sur Abra Ilocos Norte
Burley		-do-	-do-	Pangasinan Isabela Cagayan Mindoro Occidental
Native	Cigar filler	-do-	-do-	Isabela Cagayan
	Batek/ Chewing	-do-	3 in at least two provinces	La Union Ilocos Sur
	Snuff	-do-	-do-	La Union Ilocos Sur Isabela Cagayan
	Cigar Wrapper	-do-	-do-	Isabela Cagayan

## **PART II. DIRECTIONS FOR CONDUCTING ADAPTABILITY TRIALS**

### **A. RESPONSIBILITY**

In coordination with the National Tobacco Administration through the Tobacco Technical Working Group (TTWG), the private firm responsible in introducing the variety/hybrid locally shall conduct the actual trials using the production technology prescribed by the company. It shall be the responsibility of the company to choose the sites based on this manual and the farmer-cooperators with concurrence from the TTWG Chairman.

### **B. LOCATIONS**

The adaptability trials shall be established in specific number of four locations in at least two provinces where majority of the specific tobacco type/subtype is grown (Table 2).

### **C. ENTRIES**

The number of entries shall not exceed four, excluding the check variety/hybrid.

### **D. EXPERIMENTAL SITE, DESIGN, AND LAY-OUT**

The experimental site should be a representative soil type for a given location. The site should have uniform soil texture, depth, fertility and slope and should be well-drained.

A randomized complete block design with at least five replications will be used in all trials. Each farmer cooperator (FC) will plant all the entries, including the check variety. There should be at least four (4) FCs in the environmental grouping. The minimum population per variety in each site will be 500 plants and the maximum will be 2,000.

In case the field is slightly sloping and the experimental farm is divided into small paddies, all entries must be planted in all the paddies.

The difference between the test variety/hybrid and check (control) variety will be statistically determined using T-test.

For entries with resistance to soil borne-pathogens like root-knot, black shank, Fusarium wilt and bacterial wilt, the site should be located in farms where high disease pressure (85-100 percent infection at the end of the season) had been consistently observed for atleast 3 years. A susceptible and a resistant check shall be included in the trial.

## **E. CULTURAL AND POSTHARVEST MANAGEMENT PRACTICES**

The package of production technology required by the sponsoring agency/company introducing the variety/hybrid will be followed.

## **F. GRADING AND CLASSIFICATION**

This will be based on the grading and classification standards established by the sponsoring company.

## **G. DATA TO BE GATHERED**

### **1. Agronomic Characters**

- a. **Days to Flower.** The number of days from transplanting until 50% of the variety/hybrid population has one to three (1-3) fully opened flowers.
- b. **Days to Topping.** The number of days from transplanting until 50% of the variety/hybrid population is due for topping as required by the sponsoring company.
- c. **Days to First Priming.** The number of days from transplanting date to the first harvest of leaves.
- d. **Days to Last Priming.** The number of days from transplanting date to the last harvest of leaves.
- e. **Number of Harvested Leaves.** It will be based from the number of harvested leaves per plant prescribed by the sponsoring company.
- f. **Leaf length and width.** Take the length and width of each of the 25 randomly selected harvested leaves at 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> primings. Length is measured from the base to the tip of the midrib and the width, at the broadest position, of the lamina. The computed averages shall represent the leaf length and width of the entry.
- g. **Stalk length and plant height.** Stalk length is measured from the first node above the ground to the third leaf below the inflorescence, while plant height is measured from the base to the tip of the flower head from 50 random sample plants per variety/hybrid per cooperator. Samples should be taken from the inner rows and the measurement right after the last harvest.

**h. Cured Yield.** This is the actual weight of cured/fermented leaves before classification. Before each priming, take an actual stand count to record the dead plants for consideration in the computation of yield per hectare.

$$\text{Yield (ton/ha)} = \frac{\text{Total weight of leaves (kg) from all primings/variety}}{\text{No. of sample plants/variety}} \times (\text{plant pop/ha} \times 0.001 \text{ ton/kg})$$

**i. Crop Value.** Weigh sample leaves by grade after they are classified and graded using the actual price per grade. Compute the crop value using the following formula:

$$\text{Crop Value (PhP/ha)} = \frac{\text{Total weight of a specific grade (kg) from all primings/variety or hybrid}}{\text{No. of sample plants/variety or hybrid}} \times \text{plant pop/ha} \times \text{price of the grade}$$

Compute the crop value of the other grades following the above procedure, then take the sum of values of all grades to obtain the crop value per hectare.

**j. Percent (%) grade distribution.** This is an arbitrary grouping which represents the proportion of high, middle and low quality leaves per variety/hybrid.

## 2. Chemical Characters

The data on chemical characters (% nicotine and % reducing sugars) will be taken from at least three (3) farmer cooperators to be gathered from three (3) random leaf samples per stalk position as follows:

- a. Primings
- b. Cutters
- c. Leaf
- d. Tip

The sample leaves in each grouping from each entry will be stripped and half of the lamina will be prepared for grinding. Ground and weighed samples will be divided into two batches. One batch of samples will be submitted to the Techno-Laboratory Services of the Industrial Research department of NTA while the other batch of samples will be submitted to the laboratory of the sponsoring company.

### 3. Other Data

- a. **Lamina-midrib ratio (LMR)**. This is applicable for cigar wrapper only. Five (5) cured leaves per grade at P3 and P5 will be taken from all replications as representative samples of each variety/hybrid. The lamina will be separated from the midrib and each part will be weighed separately. The LMR will be computed as follows:

$$\text{LMR} = \frac{\text{Weight of lamina per priming (g)}}{\text{Weight of corresponding midrib (g)}}$$

## PART III. PROCEDURES IN RATING FOR RESISTANCE TO PESTS

### A. DISEASES

#### 1. Root Knot Nematode

Rating is done after the last priming by counting the number of galls of all plants in the inner rows. Take the average of the ratings in all plants as follows:

##### a. Gall Index Rating

Rating	No. of galls/plant
0	0
1	1-2
2	3-10
5	11-30
7	31-100
9	Above 100

##### b. Disease Rating

Gall Index Rating	Reaction Rating
1	Resistant
5	Intermediate
9	Susceptible

#### 2. Tobacco Mosaic Virus

Observe all plants in each entry at the last harvest. A resistant entry should be free from any typical tobacco mosaic virus symptoms.

### 3. Cucumber Mosaic Virus

The rating for resistance is done at button or flowering stage on all plants as follows:

CMV Rating	Reaction Category	Description
1	Highly resistant	<1% of the population per variety/hybrid is infected but with local symptoms only
3	Resistant	1-5% of the plants with chlorotic or necrotic local lesion, followed by mild systemic symptoms consisting of mosaic or mottle with minimum leaf distortion and negligible stunting of the plants
5	Moderately resistant	6-10% of the population with both local and systemic mosaic symptom prominent, but distortion observed on a few leaves only; moderate stunting
7	Susceptible	11-20 % of the plants develop severe mosaic and leaf distortion on about 50% of the leaves; plant stunted
9	Highly susceptible	>21% of the plants develop severe leaf malfunction, distortion and stunting

### 4. Potato Virus Y – Ordinary Strain

Rating is done at button stage on all plants as follows:

PVY Rating	Reaction Category	Description
1	Resistant	None of the plants show any visible symptoms
5	Moderately susceptible	>20% of the plants show mild vein banding
9	Susceptible	>20% of the population show mottling, vein banding and leaf area reduction

## 5. Black Shank

Rating is based on the percentage of all plants that shows black discoloration at the soil line, accompanied by progressive yellowing and drying of the leaves at fourth priming.

Black Shank Rating	Reaction Category	Description
1	Highly resistant	0-5% of plants with symptom
3	Moderately resistant	6-20% of plants with symptom
5	Moderately susceptible	21-30% of plants with symptom
7	Susceptible	> 30% of plants with symptom

## 6. Bacterial wilt

Rating is based on the percentage of all plants that shows wilting at 4th priming or when the population of the susceptible check reached 100% infection whichever comes first. Due to unevenness or patchy distribution of the disease within the field, counting must be based on the whole population within each plot.

Bacterial Wilt Rating	Reaction Category	Description
1	Resistant	0-25% of plants have 2 or more leaves yellow or wilted
3	Moderately Resistant	26-50% of plants have 2 or more leaves yellow or wilted
5	Moderately Susceptible	51-75% of plants have 2 or more leaves yellow or wilted
7	Susceptible	76-100 % of plants have 2 or more leaves yellow or wilted

## 7. Cercospora Leaf Spot

The rating of the varieties/hybrids is based on the number of spots per plant at all primings designated as follows:

CLS Rating	Reaction Category	Leaf Spot Density
1	Highly resistant	No spot
3	Resistant	1-4
5	Moderately susceptible	5-15
7	Susceptible	16-20
9	Highly susceptible	> 21

## B. INSECT PESTS

### 1. *Myzus persicae* (Tobacco aphid)

Resistance rating is done at 25, 60 DAT based on the following scheme:

Aphid Rating	Reaction Category	Description
1	Highly resistant	No plants with aphid colony
3	Resistant	1% of plants with aphid colony
5	Moderately susceptible	1.1-2% of plants with aphid colony
7	Susceptible	2.1-5% of plants with aphid colony
9	Highly susceptible	>5% of plants with aphid colony

### 2. *Helicoverpa sp.* (Tobacco budworm)

The rating is based on leaf area damaged on sample plants.

Budworm Rating	Reaction Category	Description
1	Resistant	>1% of leaf area damaged, no debudded plants
3	Moderately susceptible	2-5 % of leaf area damaged, 2% of plants debudded
5	Susceptible	>5% leaf area damaged >2% of plants debudded

## APPLICATION FOR REGISTRATION OF NEW TOBACCO VARIETY/HYBRID

	Registration No. _____ (To be filled by TTWG)
Application No. (To be filled by TTWG):	
Application Date:	
Botanical Name:	
Common Name:	
Proposed Variety/Hybrid Name:	
Place of Origin:	
Original Variety Name:	
Full Name of Registering Entity (Individual/Company):	
Address of Registering Entity (Individual/Company):	
Location of Adaptability Trials:	
Years of Adaptability Trials:	
Seeds to Be Supplied By:	
	_____
	Name and Signature of Applicant
The registration of the above-mentioned tobacco variety/hybrid is:	
<input type="checkbox"/> recommended for approval	
<input type="checkbox"/> not recommended	
<input type="checkbox"/> deferred	
_____	_____
Chairperson, TTWG	Date
<input type="checkbox"/> recommended for approval	
<input type="checkbox"/> not recommended	
<input type="checkbox"/> deferred	
_____	_____
Executive Director, NSIC	Date
Action taken by:	
_____	_____
Chairman, NSIC	Date

## DESCRIPTION OF VARIETY/HYBRID

### 1. AGRONOMIC CHARACTERS

- 1.1. Days to flower (days after transplanting, DAT):
- 1.2. Days to topping (DAT):
- 1.3. Days to first priming (DAT):
- 1.4. Days to last priming (DAT):
- 1.5. Number of harvestable leaves:
- 1.6. Leaf length (cm):
- 1.7. Leaf width (cm):
- 1.8. Stalk length (cm):
- 1.9. Plant height (cm):
- 1.10. Cured yield (t/ha)
- 1.11. Crop value (t/ha)
- 1.12. Grade distribution (%/grade)

### 2. CHEMICAL CHARACTERS

- 2.1. Nicotine content (%)
- 2.2. Reducing sugar content (%)

### 3. OTHER CHARACTERS (optional)

- 3.1. Lamina: midrib ratio:
- 3.2. Average burning rate per leaf (sec/point):

### 4. REACTION TO DISEASES

- 4.1. Rootknot nematode:

4.1.1. Gall index rating (check):

___0
___1
___3
___5
___7
___9

4.1.2. Reaction to the disease (check):

___1
___5
___9

- 4.2. Tobacco mosaic virus (check): \_\_\_resistant  
\_\_\_susceptible

4.3. Cucumber mosaic virus (check):  highly resistant  
 resistant  
 moderately resistant  
 susceptible  
 highly susceptible

4.4. Potato virus Y (check):  resistant  
 moderately susceptible  
 susceptible

4.5. Blank shank (check):  highly resistant  
 resistant  
 moderately resistant  
 susceptible  
 highly susceptible

## 5. REACTION TO INSECT PESTS

5.1. Tobacco aphid (check):  highly resistant  
 resistant  
 moderately resistant  
 susceptible  
 highly susceptible

5.2. Tobacco budworm (check):  resistant  
 moderately susceptible  
 susceptible