



**FOOD AND AGRICULTURAL RESEARCH AND
EXTENSION INSTITUTE**

Red Ruby



**An Improved Open-Pollinated Onion Variety
To Support National Seed Sovereignty**

The Food and Agricultural Research and Extension Institute (FAREI) is introducing **Red Ruby**, an improved, short-day, open-pollinated red onion variety for commercial cultivation. The variety is the result of nine years of systematic mass selection, rigorous screening, and extensive multilocal field trials to select for desirable traits.

Red Ruby is well adapted to the major onion-growing regions of Mauritius and is suitable for the production of mature bulbs, onion sets and green onions. As an open-pollinated variety, it offers potential for local seed production, providing farmers with an opportunity to reduce their dependence on imported hybrid seeds while promoting greater seed self-reliance and supporting sustainable onion production in Mauritius.



Red Ruby at a glance

Type: Short-day, open-pollinated red onion

Bulb yield: up to 42 t/ha

Bulb weight: 70 to 100 g in sandy soil and 100 to 180 g in other soil types

Crop cycle (transplanting): 140 to 150 days

Green onion yield: up to 18 t/ha

Average number of seeds per gram: 265

Disease tolerance: *Stemphylium* leaf blight

Onion production, consumption and seed demand

Onion (*Allium cepa* L.) is an essential commodity in Mauritian cuisine. It is present in almost every household meal, whether as a mature bulb or as fresh green onion. National consumption amounts to roughly 18,800 tonnes per year, or about 1,500 to 1,600 tonnes every month.

Annual local onion production from 2023 to 2025 is estimated around 6,300 tonnes with 335 hectares planted nationwide- providing 35% of fresh onion needs, while the remaining 65% is imported, at a cost of MUR 437 M per year. The annual demand for onion seeds is estimated around 1,600 kg, of which 30% is supplied by locally produced seeds of established open-pollinated onion varieties: Francia, Bellarose, Veronique and Local Red produced by the Agricultural Services and small-scale farmers (valued MUR 4 M) and the other 70%, is imported hybrid seed (valued to around MUR 35 M).

This high reliance on imported seeds carries another risk: disruptions in seed supply chains leading to the discontinuation of supply of recommended varieties, requiring to start over and test new varieties. This vulnerability, combined with the rising cost of imported seed, is exactly why developing strong, locally adapted open-pollinated varieties has become a national priority.

Onion breeding programme

FAREI initiated an onion breeding programme in 2015 to reduce the country's dependence on costly imported hybrid seeds, boost domestic onion production, address the declining yields and bulb quality of existing open-pollinated varieties.

In this context, AVON 1067, a short day, open-pollinated red onion breeding line was introduced from the World Vegetable Centre, Taiwan. The breeding line underwent a nine-year mass selection process, a technique outlined by Singh (1983) to gradually stabilise desirable traits.

The nine-year selection process was as follows:

Year 1: AVON 1067 seeds were sown to raise mother bulbs. Plants and bulbs judged true-to-type were selected for yield, bulb size, shape, uniformity, disease tolerance and plant vigour.

Year 2: Selected mother bulbs in Year 1 were planted for seed production.

Year 3: Seeds harvested in Year 2 were sown to raise a new bulb crop and true-to-type mother bulbs were again selected and replanted for seed.

Years 4 to 8: This selection cycle was repeated for three more generations to lock in the desired traits: uniform bulb shape and size, high bulb yield, disease tolerance, minimal bolting (premature flowering and stable performance across growing seasons. Field trials were conducted on both research stations and farmers' fields to validate the stability of these desirable traits across different agro-climatic zones.

Throughout this period, the selected population was also benchmarked against existing open-pollinated varieties for yield, bulb shape, disease tolerance, bolting tendency, performance as a green onion, set-grown bulb production, bulb quality and market acceptance.

In **Year 9**, seeds of the improved breeding line AVON 1067 were produced and released as a new open-pollinated variety **Red Ruby**.



Red Ruby: mature bulb with root system (left) and field-grown crop (right).

Plant and bulb characteristics of onion variety Red Ruby

Red Ruby has an upright growth habit, thick dark green leaves with a waxy texture and a strong well-developed root system. It exhibits tolerance to *Stemphylium* leaf blight, an economically important onion disease in Mauritius. At harvest maturity, its displays uniform fall over of the leaves, making it easier to schedule the harvest.

Bulb production using transplanting method (May to November)	
Crop cycle	140 to 150 days
Percentage Bolting	< 6 %
Marketable bulb yield	23 to 27 t/ha in sandy soils and up to 42 t/ha in other soil types

The harvested bulbs are firm, hold their outer scales well and have a pungent flavour suited to local cooking preferences.

The bulb characteristics are as follows:

Red Ruby - Bulb characteristics		
Shape	Globular	 Uniform globular shape Red Ruby bulbs
Skin colour	Red	
Flesh colour	Whitish-pink, with red inner rings	
Bulb weight	70 to 181 g	
Bulb diameter	51 to 91 mm	
Neck size	Thin	
Skin thickness	Thick	

Number of scales leaves at harvest	2 to 3	 Whitish pink flesh colour
Dry matter content	19 %	
Total soluble solids	13 %	

Bulb keeping quality

Red Ruby bulbs display very good keeping quality up to four months under cold storage conditions (2 to 4 °C, 65 to 75% relative humidity).

Table 3. Percentage of storage losses recorded in Red Ruby bulbs

Storage Duration	Ambient Condition* (%)	Cold Storage** (%)
One month	2.1 to 3.7	0.1 to 1.0
Two months	3.6 to 5.7	0.8 to 1.4
Three months	7.1 to 12.1	1.2 to 2.8
Four months	16.0 to 18.6	2.6 to 4.1

*Ambient: 25–30 °C, 65–75% relative humidity.

**Cold storage: 2–4 °C, 65–75% relative humidity

Bulb production

Red Ruby bulbs can be produced by direct sowing of seeds or transplanting of seedlings raised in beds or seed trays. Its marketable bulb yield ranged from 23 to 42 t/ha depending on soil types, agroclimatic conditions and management practices.

Bulb production from seeds (Mid-April to November)		
Direct seed sowing density	4.5 to 5 kg seeds /ha	 Red Ruby bulbs
Seedling transplanting density	60 /m ²	
Crop cycle Direct sowing From transplants	130 to 150 days 140 to 150 days	
Marketable bulb yield	23 to 42 t/ha	

Sets, green onion and early bulb production

Red Ruby is suitable for production of sets during the period of August to November.

Sets production and sets characteristics

Sets Production from seeds (August to November)		
Sowing density	10 g seeds /m ²	 Red Ruby sets
Sets production cycle	90 to 100 days	
Sets characteristics - Colour - Diameter - Weight	Red 8 to 23 mm 3 to 6 g	
Number of sets per kg	165 to 340	

The use of sets enables planters to produce green onion up to 18 t/ha and also early bulb production in July/August, thereby extending onion production season.

Green onion and early bulb production from sets

Green onion production from sets (March to May)		
Planting density	60 sets /m ²	 Red Ruby Green onion
Crop cycle	40 to 45 days	
Plant height	53 to 80 cm	
Number of leaves per plant	5 to 12	
Weight per plant	30 to 100g	
Green onion yield	7 to 18 t/ha	
Early bulb production from sets (March to June/July)		
Planting density	60 sets /m ²	 Red Ruby bulbs produced from sets early in the season
Crop cycle	90 to 110 days	
Marketable bulb yield	18 to 23 t/ha	

Seed production

As an open-pollinated variety, Red Ruby's greatest advantage is that farmers can produce and save their own seeds rather than buying hybrid seeds every season. The variety demonstrates strong productivity with the following characteristics

- **Planting density:** 20 mother bulbs/m²
- **Seed production cycle:** 150 to 170 days
- **Average number of flowering stalks per plant:** 4
- **Average seed weight per umbel:** 3.6 g
- **Average number of seeds per gram:** 265



Red Ruby seed umbel

To maintain the true-to-type characteristics of Red Ruby, FAREI recommends selecting superior mother bulbs every two years. This selection helps preserve the variety's genetic integrity and ensures long term production of high quality, true to type seeds.

Benefits of Red Ruby

The widespread adoption of Red Ruby will help to increase local onion production, extend production season, reduce reliance on imported onions and hybrid onion seeds, lower production costs and strengthen the country's seed and food sovereignty.

Reference

Singh, B. D. (1983). Plant Breeding: Population Improvement. Kalyani Publishers, Ludhiana, India.