

Performance of RR11 417 in an on-farm trial in North Malabar region of Southern India.



Fig 1. Distinct high branching pattern of clone RR11 417

Narayanan C. and Kavitha K. Mydin

Rubber Research Institute of India
Kottayam 686 009, Kerala, India

Continued research on genetic improvement of commercial yield of clones of *Hevea* at Rubber Research Institute of India resulted in release of four RR11 series of hybrid clones viz. RR11



Narayanan C.

100, 200, 300 and recently, RR11 400 series. Among the first three series, the flagship clone RR11 105 exhibited exemplary performance and hence quickly occupied majority of the rubber growing area in the traditional region. Meanwhile, efforts to develop more clones with enhanced growth and yield performance continued at RR11. As a result, after systematic evaluation at various stages, Rubber Board released RR11 414 and RR11 430 in 2005 and RR11 417 and RR11 422 in 2009, for large-scale planting in traditional regions. Simultaneously, planting material of RR11 400 series clones were also supplied to growers of traditional region for multiplication and planting.

*Corresponding author: email: cnarayanan@rubberboard.org.in

Owing to the vigorous growth and appreciable yield performance, both private growers as well as large estates have adopted two clones, viz. RR11 414 and RR11 430.

Among the clones released in 2009, RR11 417 is characterised by tall and straight trunk. It has high branching pattern with moderate to heavy branches, broad and open canopy with semi-glossy leaves. It possesses average bark thickness, high renewed bark thickness and above average numbers of latex vessel rows. This clone has been found to show more than 30% improvement in yield over RR11 105 based on eleven years of tapping in experimental trials. While it shows high incidences of powdery mildew and pink diseases and less prone to tapping panel dryness (TPD). In the following sections, growth and yield performance of RR11 417 in an on-farm trial at Ottapalam (Kerala) is discussed.

The on-farm trial is located in a private farm of Ramachandra Menon at Pallamangalam near Palappuram (Ottapalam, Palakkad Dt., Kerala



Fig 2. Leaf characteristics of clone RR11 417 (Note the irregular wavy margin of lamina and horizontal orientation of the petiole)

State; 10.77° N, 76.38° E; alt., 34 msl.). The location which is characterised by laterite soil, receives about 250 cm of rainfall annually (Anu



Fig 3. Clone RR11 417 during first year of tapping (Ramachandra Menon also is seen)

Simon and Mohankumar, 2004). Maximum temperature ranges from 33°C in January to 37°C during Mar-Apr and thereby gradually decreasing in the rainy months of Jun-Aug up to December (Anon, 2003).



Fig 4. Clone RR11 417 showing moderate to heavy branches, broad and open canopy

For purpose of establishment of the on-farm block trial, three hundred brown-budded stumps each of RR11 417 and RR11 105 were procured from nursery of Rubber Board and planted in polybags. Subsequently, one-whorled polybag plants of each

clone were separately planted in blocks in 2003. Trees were opened for tapping in 2010 when majority of the trees attained tappable girth. From 2010 onwards, tree of both the clones were assessed for growth, yield performance and secondary traits. In order to assess initial tappareability, growth measurements were taken based on girth at 150 cm height for all the trees in each block. Tappareability was assessed based on number of trees tapped in each block and total number of trees of each clone. The tapping was initiated in 2010 [tapping system: S/2(RG) d3] without stimulation. Yield performance was assessed based on standard procedures (Mydin and Saraswathyamma, 2005). Briefly, during tapping day in each month of the year, total volume of block-wise latex yield was measured and samples were drawn for assessing dry rubber content (DRC) following oven-dry method. Finally, rubber yield (g/t) of the clones was computed based on the fresh

Table 1. Girth, tappable and bark thickness in clone RRH 417

Clone	Glrrh (cm)			Tappability (%) in opening yr	Bark thickness (mm)
	Tapping years				
	1st year	2nd year	3rd year		
RRH 417	49.3	50.3	55.2	50.2	8.9
RRH 105	44.4	46.5	51.1	17.4	9.8

weight of latex, dry rubber content and number of trees of each clone under tapping.

Bark thickness of the clones was assessed using a bark gauge. Clones were also assessed for secondary characters like susceptibility to pink and abnormal leaf fall (ALF) diseases, tapping panel dryness (TPD) and wind damage in terms of the percentage of trees affected.

Regarding agro-management and plant protection measures, the recommendations of the Rubber Board India were followed. During soil fertilization, organic manure was also applied in addition to other recommended dosage of fertilizers. However, there was no application of fungicidal spraying particularly for abnormal leaf fall disease. Nevertheless, curative treatment was provided for pink disease. Observation was also made on wind damage to the clones based on percentage of trees affected.

In general, clone RRH 417 showed superior performance in terms of growth, yield and other important traits. Clone RRH 417 recorded maximum girth (49.3 cm) and tappability (50.2%) compared to RRH 105 (Table 1) during opening year (44.4 cm; 17.4%). The superior growth performance continued in subsequent years also. The vigorous growth performance of clone RRH 417 commensurate with the earlier findings from several studies on RRH 400 series clones (Mydin *et al.*, 2011). Clone RRH 417 also had high bark thickness (Table 1).

Regarding dry rubber yield, clone RRH 417 exhibited comparatively good performance from the initial tapping onwards (Table 2). In the opening year, clone RRH 417 recorded maximum yield of 34.8 (g/t) when compared to RRH 105 (29.3 g/t). This clone continued to exhibit its superior performance in subsequent years also.

Table 2. Mean dry rubber yield in clone RRH 417

Clone	Yield (gram/tree/tapping)				
	Tapping years				Overall mean (4 yrs.)
	1st year	2nd year	3rd year	4th year	
RRH 417	34.8	35.5	40.9	54.0	41.3
RRH 105	29.3	30.9	37.0	50.6	36.9

Based on yield during four years of tapping, clone RR11 417 showed maximum yield of 41.3 g/t compared to RR11 105 (Table 2).

Besides superior yield trend, clone RR11 417 also displayed better performance in terms of

secondary attributes. Regarding pink disease incidence, while clone RR11 417 exhibited lesser disease incidences (14.4%) compared to RR11 105 (22.5%) during initial years, incidence of pink

showed slight increase during subsequent years which is characteristic of this clone as indicated earlier.

However,

incidence of abnormal leaf fall disease was considerably less in RR11 417 (less than 5%) compared to RR11 105 (more than 50%), under unsprayed conditions. Abnormal leaf fall disease is a major problem in rubber plantations demanding vigilant application of fungicides to prevent reduction in yield. In view of the above, lesser disease incidences is a desirable economic trait observed in RR11 417.

With reference to TPD, clone RR11 417 exhibited lesser incidences (9.6%) compared to RR11 105 (14.4%). The clone RR11 417 also displayed resilience against wind damage when compared to RR11 105.

Pre and post-release evaluation of RR11 400 series clones in both experimental as well as on-farm trials over



Fig 5. Trees of clone RR11 417 showing straight trunk and high branching

several locations, have already established superior performance of these clones in terms of growth, yield and other important secondary characters (Licy *et al.*, 2003; Mydin and Mercykutty, 2007, Mydin *et al.*, 2011, 2012). Along with other recommended RR11 400 series clones, RR11 417 established its superior performance across locations. It is worthwhile to note that RR11 417 showed superior yield performance during peak as well as summer months over 10 years of tapping (Mydin *et al.*, 2011).

The yield performance of RR11 417 across diverse locations in traditional (Kanyakumari) and non-traditional regions (Nagarkata and Agartala), was found superior or comparable with that of RR11 105 (Meenakumari *et al.*, 2011). Also, similar studies on yield performance of RR11 417 at Padiyoor in Northern Kerala (rubber yield, 54.01 g/vt) clearly indicated that the clone RR11 417 is capable of adapting to wide range of agro-climates.

Besides growth and yield, RR11 417 also possesses superior timber yield. Besides possessing high wood density, clone RR11 417 also exhibited high timber yield in terms of clear bole volume with 0.114 m³/tree at the age of 16 years and 0.16 m³/tree at the age of 20 years which adds to the economic value of this clone (Mydin *et al.*, 2011; Meenakumari *et al.*, 2013).

The result of the present study in the on-farm block trial at Ottapalam clearly testifies superior growth and performance clone RR11 417. It may be noted that Ottapalam is located in a comparatively drier part of Kerala experiencing lesser amount of rainfall and higher temperature regimes. Hence, based on the previous results from experimental trials within and outside Kerala, and present observations, it could be inferred that RR11 417 has the potential to withstand drier conditions also without compromising yield.

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