

Promising new hybrids for improving productivity of coconut

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Coconut (*Cocos nucifera* L.) is one of the most useful palms in the world which provides food, shelter and a number of industrial products from each and every part of the palm useful in the everyday life of human beings, so eulogised as “Kalpavriksha”. Coconut is grown in over 93 countries in an area of 12.568 million ha, producing 67698 million nuts with a productivity 5387 nuts/ha (APCC Statistical Year Book 2019) In India, it is cultivated in 2.17 million ha. with production of 20,308 million nuts with an average productivity of 9,345 nuts/ha during 2019-2020.

In India coconut sector is facing the problem of low productivity as $\frac{1}{3}^{\text{rd}}$ of total area is under cultivation

Coconut productivity can be increased by cultivation of improved varieties and by adopting nutrient management, water management, pest and diseases management. Enhancing productivity through cultivation of improved varieties is more remunerative in coconut.



Vasista Ganga

Performance of Coconut Hybrids/Vareites						
Parameters	Abhaya Ganga	Vynatheya Ganga	Vasista Ganga	Gouthami Ganga	ECT (Local Check)	Godavari Ganga (Hybrid Check)
Number of nuts produced /palm /year	135.80	118	125	85.73	88.13	115
Copra content (g/nut)	170.0	190.50	185.25	156.7	124.1	150
Copra output/ palm/ year (kg)	22.47	22.47	21.86	13.32	10.25	18.44
Copra output/ ha/ year (t)	3.70	3.37	3.82	2.3	1.54	2.79
Oil content (%)	72	65.8	69	68.5	64.0	68.0
Oil yield/palm/year (kg)	15.50	14.7	15.11	9.70	6.56	12.53
Oil yield/ha/year (t)	2.80	2.20	2.64	1.7	1.0	1.88
Tender nut water content (ml)	346	327	395	447	291	306
TSS of tender nut water (OB)	5.00	7.00	6.20	7	5.00	6.75

with old and senile palms and planting of local varieties from unknown mother palms chowdappa et al. 2015). The productivity can be increased in one way by cultivation of improved varieties and in another way by adopting nutrient management, water management, pest and diseases management. Enhancing productivity through cultivation of improved varieties is more remunerative in coconut. Only after 15 or 20 years, the grower will be in a position to reap the reward of his investment. As coconut is a perennial crop having long juvenile phase (7-10 years) which takes another five years

or more to come to full bearing stage, the farmers have to wait for 15-20 years for attaining economic return from coconut (Regi et al., 2021). Traditional plant breeding methods like introduction, selection and hybridisation, with necessary modifications have been successfully employed for yield improvement in coconut. In India, hybridization programme was initiated in the year 1932, at the Coconut Research Station, Nileshwar, and milestone in the hybridization of coconut on hybrid vigour in the progeny with parentages West Coast Tall and Chowghat Green Dwarf was reported by Patel, (1937). Later, in the



Gouthami Ganga

course of time, other coconut growing countries like Philippines, Indonesia, Sri Lanka, Cote d'Ivoire and Jamaica started hybridization. Despite the many problems that is unique to hybridization in coconut like long vegetative phase, low multiplication rate, and ineffective clonal propagation, requirement of climber to make crosses and large area required for planting field evaluation trials and slow multiplication rate, many selections and hybrids have been developed in coconut (Samsudeen et al., 2017).

The Horticultural Research Station, Ambajipeta started hybridization work in coconut in early 1960's. In the year 1993, Godavari Ganga, a Tall x Dwarf hybrid was released and gained much attention among coconut farmers which was having high yielding potential of 120-140 nuts/palm/year. (Maheswarappa, et al. 2016) and with precocity in bearing of four years after planting. The collection and maintenance of coconut germplasm during 1960's and 1970's at HRS, Ambajipeta and hybridization of various elite accessions led to the development of various new hybrids in coconut. The crop improvement in coconut confined to the exploitation of basic breeding approaches like mass selection and hybridization. Attempts were made to study various cross combinations like Tall x Tall, Dwarf x Tall and Tall x Dwarf, of varieties in various field experiments. Utilization of available genetic resources and selection of superior lines from germplasm/hybrids developed by evaluating at various locations in India has resulted in the development of following improved coconut varieties/hybrids. The best performing cross combinations, which were proved/ realized to be suitable for cultivation by various scientists and breeders were explained in detail about the growth and yield attributing characters.

The hybrids Abhaya Ganga, Vynatheya Ganga and Vasista Ganga were developed for improved nut quality and yield. The variety Gouthami Ganga is particularly for tendernut purpose. Ramanandam et al. (2017) reported that hybrid developed from crossing the parents Gangabondam as female parent and Laccadive Ordinary Tall as male parent is a semi tall type with circular crown with trunk girth of 107.7 cm comprising of 38.3 leaves per palm. It comes to bearing in four years (38-42 months) after planting. The average mean nut yield of 135.8 nuts/palm/year was recorded at Ambajipeta. It contains good quantity of tender nut water (on an average 346 ml/nut) with TSS-5.6 OBrix. The average copra content from each nut is 170 gm and oil percentage is 72%.



Abhaya Ganga

The average copra output is 3.70 t/ha/year with 32.62 % increase and 3.37 % increase over local check and hybrid check and oil output is 2.80 t/ha/year which recorded 48.94 % increase and 2.2 % increase over local check and hybrid check (Godavari Ganaga) respectively. This hybrid is moderately resistant to bud rot disease and is having potential for more oil yield. The hybrid is named as Abhaya Ganga and recommended for cultivation in Andhra Pradesh.

A Tall x Dwarf hybrid, Philippines ordinary Tall x Gangabondam is found with semi tall growing habit, circular crown with trunk girth of 92.90 cm comprising 40.25 leaves per palm. It comes to bearing in 4-5 year (48 months) after planting. The average mean nut yield of 118 nuts/palm/year was recorded at Ambajipeta. It contains good quantity of tender nut water (326.58 ml/nut) with TSS-7.0 OBrix. The average copra content from each nut is 190.50 gm and oil percentage is 65.8 %. The average copra output is 3.37 t/ha/year, with improved yield over 20.79 % and 3.82 % compared to local and hybrid existing cultivars. Oil output is 2.20 t/ha/year was also recorded with 17.02 % more yield compared to local cultivar (ECT). This hybrid is moderately resistant to ganoderma, bud rot and stem bleeding diseases and is recommended for cultivation in Andhra Pradesh as Vynatheya Ganga.

Ramanandam et al. (2017) evaluated that a semi tall (Dwarf x Tall) hybrid using Gangabondam as female parent and Philippines ordinary Tall as male parent is with circular crown with trunk girth of 117.10 cm. It comprises of 35.64 functional leaves per palm at the age of 28 years. It comes to bearing in around four years (40 months) after planting. Average nut yield under normal conditions is 125



Vasista ganga Bunch



Vynatheya Ganga

nuts/palm/year. Good quantity and quality of tender nut water (395 ml) with TSS of 6.20 OBrix is recorded. The average copra output is 3.82 t/ha/year and oil output is 2.64 t/ha/year with more yield (36.92 % and 40.43 % respectively) compared to local cultivar (ECT). The variety is moderately resistant to bud rot disease and mild to medium scale incidence of eriophyid mite. The cross combination is named as Vasista Ganga and is recommended for cultivation in Andhra Pradesh and Karnataka.

A dwarf variety selection from Gangabondam with semi circular crown, thin trunk 59.50 cm comprising 30.2 functional leaves per palm was also developed. It is a precocious bearer which comes to flowering in 31/2 to 4 years (36 months) after planting. The average mean yield of 85-93 nuts/palm/year was

recorded at Ambajipeta. The variety contains high quantity of tender nut water (on an average of 450 ml/nut) with TSS-7.0 OBrix. This variety is very much suitable for tender nut purpose. The average copra content from each nut is 156.7 gm and oil percentage is 68.5 %. The average copra output is 2.3 t/ha/year and oil output is 1.7 t/ha/year. Dwarf variety is named as Gauthami Ganga and recommended for cultivation in Andhra Pradesh.

As per the Government of India, Gazette notification 1369 dt. 7th April 2021 by Ministry of Agriculture and Farmers welfare, India, the above hybrids and varieties are recommended for release on commercial cultivation in the east coastal region of India especially, Andhra Pradesh. The hybrids Abhaya Ganga, Vynatheya Ganga and Vasista Ganga were developed for improved nut quality and yield. The variety Gauthami Ganga was released especially for tendernut purpose.

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