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Assessment of yield and yield attributing characters of coconut hybrids of location specific cross combinations under coastal ecosystem of Maharashtra

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ABSTRACT

The experiment was carried out at Regional Coconut Research Station, Bhatye, Ratnagiri under All India Coordinated Research Project on Plantation Crops. The experiment was initiated in the year 2006 and laid out in randomized block design with four replication and healthy hybrid seedlings of COD X Benaulum Yellow Round (CRP-513), COD X Pratap, COD X Benaulum Green Long (CRP – 514), Benaulum Yellow Round (CRP-513) X COD, Pratap X COD and Benaulum Green Long (CRP-514) X COD cross combinations were planted with a spacing of 7.5 m × 7.5 m. Significantly highest number of inflorescence per palm (11.52), maximum number of female flowers per palm (288.41) and highest fruit setting (47.95 %) were recorded in COD x CRP-513 hybrid (H_1). This hybrid combination was at par with COD x Pratap. Whereas, the least number of inflorescence/palm (9.23), minimum number of female flowers per palm (253.83) and lowest fruit setting (40.40 %) were observed in CRP-513 x COD hybrid. With respect to yield, Maximum nut yield (118.41 nuts/palm and 20721.8 nuts/ha.), copra yield (20.13 kg/palm) and highest oil yield (13.69 kg/palm and 2.39 t/ha) were observed in COD x CRP-513 hybrid. Conversely lowest nut yield (83.83/palm and 14670.3 nuts/ha.), copra yield (14.25 kg/palm) and oil yield (9.69 kg/palm and 1.69 t/ha) was found in CRP-513 x COD hybrid. Among the location specific coconut hybrids cross combinations evaluated, the cross combinations involving dwarf as female parent and tall cultivars, viz. COD x Benaulum Yellow Round (CRP-513) performed better yield performance.

Keywords: Coconut, hybrids, female flowers, nut yield, copra yield

Introduction

The Coconut Palm (*Cocos nucifera* L.) known as Kalpavriksha is a versatile plantation crop in Maharashtra state especially in the Konkan region. The coconut palm exerts a profound influence on the rural economy of the many states where it is grown extensively and it provides nourishment to more than 10 million people. In Maharashtra, the major area under coconut cultivation is confined to the coastal region comprising Sindhudurg, Ratnagiri, Raigad, Thane and Palghar district owing to the suitability of agro-ecological conditions and is mostly grown by small holders. Generally, it is grown in diverse farming systems which is providing livelihood to millions of the region (Malshe *et al.*, 2024) [1]. In Konkan region, the predominant variety under cultivation a tall variety 'West Coast Tall' (Banawali) with an average yield potential of 80 to 90 nuts/palm/year.

The productivity level of nuts in this coconut growing region of Maharashtra is beneath the potential yield because of growing traditional variety and non adoption of scientific production technologies. Development of high yielding varieties or hybrids is essential to achieve higher nut production as well as productivity in coconut. Hybrid varieties have been developed by combining the early flowering trait of dwarf cultivar and hardiness and high yielding characters of tall cultivar (Jerard *et al.*, 2015) [2]. Hybridization is a tool for improving local or indigenous crop varieties because it combines the natural resilience of native plants with the high-yielding traits of modern varieties. Identification of suitable hybrid to a specific agroclimatic region has importance in achieving higher and sustained yield. Considering these views, the present investigation was carried out, to assess the yield performance of location specific cross combinations under coastal ecosystem of Maharashtra.

Materials and Methods

The present investigation was carried out at Regional Coconut Research Station, Bhatye, Ratnagiri under All India Coordinated Research Project on Plantation Crops. The experimental location is on the seashore of the Arabian Sea having littoral sandy soil. The climate is hot and humid and comes under south konkan coastal agroclimatic zone. The experiment was initiated in the year 2006 and laid out in randomized block design and healthy hybrid seedlings of COD x Benaulum Yellow Round (CRP-513), COD x Pratap, COD x

Benaulim Green Long (CRP – 514), Benaulim Yellow Round (CRP-513) x COD, Pratap x COD and Benaulim Green Long (CRP-514) x COD cross combinations were planted with a spacing of 7.5 m × 7.5 m (with a density of 175 palms/ha) in randomized block design with four replications @ 6 palms/hybrid/replication under irrigated conditions. The recommended agropractices like nutrient management, irrigation, pest and disease management, etc. were followed uniformly to manage the experimental palm block. The yield attributing characters viz; no. of inflorescence per palm and number of female flowers per palm were recorded. The fruit setting was estimated in percentage by using formula $\frac{\text{number of nuts}}{\text{number of buttons}} \times 100$. The yield of nuts per palm was recorded periodically at each harvest from July, 2024 to June, 2025 and summed to get nut yield per palm per year. The random samples of nuts from each hybrid in each replication was taken for recording copra content. The oil content in copra was analyzed oil yield per palm was worked out. The data on these characters were statistically analyzed (Panse *et al.*, 1985) [3].

Results and Discussion

The data pertaining to the yield attributing characters viz; number of inflorescence annually produced per palm, total number of female flowers per palm, fruit setting percentage are presented in Table 1. From the data, it is revealed that these parameters are significantly varied among different location specific cross combinations of coconut.

Significantly highest number of inflorescence per palm (11.52) was emerged in COD x CRP-513 hybrid (H₁) which was at par with COD x Pratap (H₂). Whereas the least number of inflorescence/palm (9.23) was observed in CRP-513 x COD hybrid (H₄). In coconut, the hybrids generally show an increased rate of leaf and inflorescence production. The variations may also be governed by the genetic make up of the specific hybrid (cross combination). The hybrids exhibit vigorous vegetative growth and a higher rate of annual leaf production, correspondingly produce a higher number of inflorescences per year. The variation in inflorescence emergence per year among the coconut hybrids was also reported by Sumitha *et al.* (2020) [4].

Among the six hybrids, the maximum number of female flowers per palm (288.41) was noted in COD x CRP-513 hybrid (H₁). It was closely followed by COD x Pratap and CRP-514 x COD hybrids (Table 1). The lowest number of female flowers per palm was recorded in CRP-513 x COD hybrid (253.83). This increased tendency towards female flower formation can be attributed to the female flower production potential inherited from COD (Thangahemavathy and Balaji, 2008). The similar findings were reported by Kumaran *et al.* (2006) [5] and Sivakumar *et al.* (2024)

The fruit setting percentage is an influential factor for nut yield in coconut. In the present study, COD x CRP-513 hybrid exhibited highest fruit setting (47.95 %) and it was at par with COD x Pratap (46.97 %) and CRP-514 x COD (46.67 %). However, CRP-513 x COD hybrid (H₄) registered the lowest fruit setting (40.40 %). In coconut, the fruit set is governed by inter-spadix overlapping of female and male phases coupled with cross pollination with surrounding palms. Nair *et al.* (2003) [6] and Sumitha *et al.* (2020) [4] also documented the analogous trend.

Yield performance data of six coconut hybrids of location specific cross combinations are presented in Table 2 indicating that the coconut hybrids showed the significant variation in nut yield, copra and oil yield.

Among different hybrids, the annual nut yield was in the range of 83.83 to 118.41 nuts per palm and the maximum yield (118.41 nuts/palm and 20721.8 nuts/ha.) was recorded in COD x CRP-513 hybrid. It was at par with COD x Pratap and CRP-514 x COD hybrids. The nut yield was lowest (83.83/palm and 14670.3 nuts/ha.) in CRP-513 x COD hybrid (H₄). This indicates that the reciprocal cross of the top-performing hybrid (COD x CRP-513) produced a low yield potential. The higher number of nuts was harvested in COD x CRP-513 hybrid which may caused by an increased number of female flowers coupled with highest fruit setting percentage. High yielding coconut hybrids generally possess a greater number of female flowers (Kannan *et al.*, 1974) [7]. The results obtained in this investigation are close agreement with the finding of Sivakumar *et al.* (2024) and George *et al.* (2025) [8].

The copra yield in tested hybrids showed significant variation and the maximum copra yield (20.13 kg/palm) was noted in COD x CRP-513 (H₁) hybrid. It was at par with COD x Pratap and CRP-514 x COD hybrids. COD x CRP-514 and Pratap x COD hybrids were on par with each other. The lowest copra yield (14.25 kg/palm) was found in CRP-513 x COD hybrid. The higher copra yield in COD x CRP-513 and COD x Pratap hybrids may be attributed to higher nut yield and copra content compared to other hybrids. The results are confirmatory with the findings of Ramanandam *et al.* (2017) [9].

The data pertaining to the oil yield in different hybrids perused that COD x CRP-513 registered significantly highest oil yield (13.69 kg/palm and 2.39 t/ha). It was closely followed by COD x Pratap and CRP-514 x COD hybrids. Whereas, the lowest oil yield (9.69 kg/palm and 1.69 t/ha) was recorded in CRP-513 x COD hybrid. The economic characters of coconut viz; copra weight and oil content per palm was more in hybrids, as these characters are influenced by number of nuts per palm directly. Similar results of higher copra output per palm in dwarf × Tall hybrids was reported by Ramanandam *et al.* (2017) [9] in GBGD × PHOT hybrid cross combination.

Table 1. Yield attributing characters of coconut hybrids of location specific cross combinations

Coconut hybrids		No. of inflorescence/ palm	No. of female flowers/palm	Fruit Setting %
H ₁	COD x CRP-513	11.52	288.41	47.95
H ₂	COD x Pratap	11.44	285.50	46.97
H ₃	COD x CRP-514	10.38	273.62	44.53
H ₄	CRP-513 x COD	9.23	253.83	40.40
H ₅	Pratap x COD	10.30	270.25	43.87
H ₆	CRP-514 x COD	10.81	281.79	46.67
S. E. m.±		0.40	3.62	1.27
CD (<i>P</i> = 0.05)		1.21	10.78	3.83
CV %		7.59	4.80	5.64

Table 2. Yield performance of six coconut hybrids of location specific cross combinations

Coconut hybrids		Nut yield (No./palm)	Nut yield/ha (No.)	Copra yield (kg)	Oil yield (kg/palm)	Oil yield (t/ha)
H ₁	COD x CRP-513	118.41	20721.8	20.13	13.69	2.39
H ₂	COD x Pratap	115.50	20212.5	19.64	13.35	2.33
H ₃	COD x CRP-514	103.62	18133.5	17.61	11.98	2.09
H ₄	CRP-513 x COD	83.83	14670.3	14.25	9.69	1.69
H ₅	Pratap x COD	100.25	17543.8	17.04	11.59	2.02
H ₆	CRP-514 x COD	111.79	19563.3	19.00	12.92	2.26
S. E. m.±		6.62	-	1.13	0.77	0.13
CD (<i>P</i> = 0.05)		19.96	-	3.39	2.31	0.40
CV %		12.54	-	12.54	12.54	12.57

Conclusion

Among the location specific coconut hybrids cross combinations evaluated, the cross combinations involving dwarf as female parent and tall cultivars, viz. COD x Benaulim Yellow Round (CRP-513) performed better and recorded significantly maximum nut, oil and copra yield over other cross combinations. This is one year drift, the further evaluation is essential for substantiation of results.

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