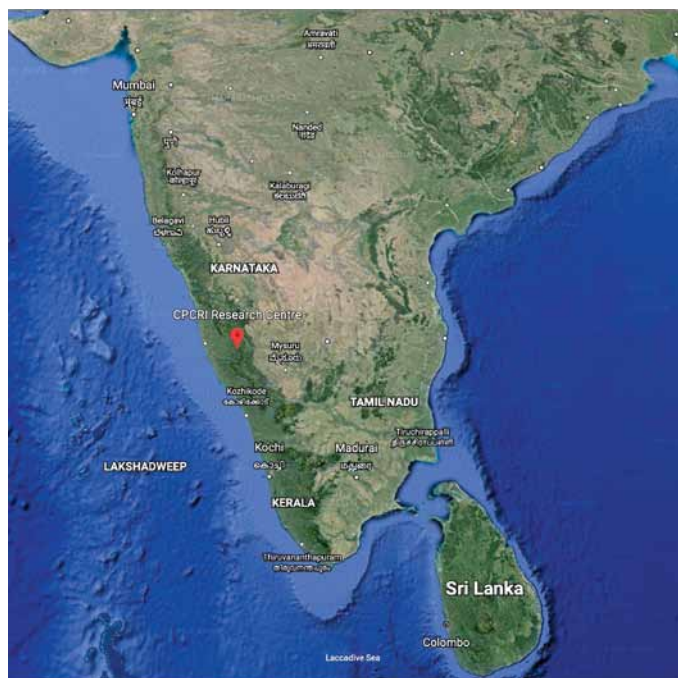


ICAR-CPCRI Research Centre, Kidu – Celebrating golden jubilee: The saga of progress and contributions

ICAR-CPCRI Research Centre, Kidu, Karnataka is celebrating its golden jubilee in the year 2022-23, providing a unique occasion to recall the innumerable ways in which the centre has made its influence in fulfilling its mission and needs of the country. The golden jubilee also provides an opportunity to reflect on the past achievements and to introspect on the preparations to meet the challenges that lie ahead.

THE centre is located at Kidu, Bilinele village, Kadaba taluk, Dakshina Kannada district of Karnataka State of India. It is located at a latitude of 12.30° North and a longitude of 75.20° East, with an altitude of 291 m above MSL. The centre is 9 km away from the famous Kukke Sri Subramanya Temple on Subramanya-Uppinangady road that connects NH-48. The nearest railway station is Subramanya Road located at a distance of 2.5 km from the centre, and Mangalore being the nearest airport (140 km).



Location of CPCRI RC Kidu, India

The locality has tropical weather, with average temperature of 24°C-40°C in summer and 18°C-33°C in winter, with annual rainfall of 280-420 cm distributed throughout the year with major portion received during the period of June-October. The centre has a large contiguous area (120 ha) nestled in the western ghats, amidst thick reserved forest, and is blessed with all natural



CPCRI RC, Kidu

resources like fertile soil and abundant water availability from the perennial flowing river and ideal climatic and micro-climatic conditions without any risk of natural calamities.

From a modest beginning in the year 1972 as Seed Farm at Kidu, under Central Plantation Crops Research Institute, Kasaragod, to produce genetically superior quality planting materials of Coconut, Arecanut, Cocoa and Cashew, the centre has grown in leaps and



Office building of Seed Farm, Kidu (1972-73)

bounds with significant glories and accomplishments in its chronicle. The International Coconut Gene Bank for South Asia and Middle East (ICG-SAME) under COGENT was established at the centre in 1998 and subsequently the centre was upgraded to ICAR-CPCRI Research Centre during 2001.

The development trajectory: Challenges faced

Initially after establishment of Seed Farm in 1972, irrigating the seedlings planted in successive years was a herculean task. Though water was available in plenty from the perennial river *Kumaradhara*, flowing along the periphery of the farm, irrigation was a major challenge in the initial days, due to lack of infrastructure for pumping water and non-availability of clearance to pump the river water for irrigation. Under these situations, the huge farm area, bright sunny days during peak summer and limited man power, further worsened the situation. It was very tiring to collect water in containers from the river situated on one corner of the farm and to carry it all through the farm to irrigate the individual seedlings on the other corner in undulating topography under bright sunlight. To overcome the burden on the labour, small catchment pits/ponds were dug in equidistant places all through the farm for rainwater harvesting and also, initially these pits were filled with water from river, individually through containers to use this stored water for subsequent irrigation later. The committed hard work of each individual during initial challenging days is worth reminiscing. Over the period, nearly nine Directors, >18 Scientist-in-charge, >45 technical staff, >88 permanent skilled supporting staff and >15 administrative staff as well as more than two contact officers have contributed to the growth of this centre.



For effective utilization of water from the river *Kumaradhara*, water is pumped, using pump sets (diesel as well as electric), to two granite slab-lined water storage tanks constructed (during 1984 and 1989) at the highest altitude of the farm, one each in the new area and old area of the farm. The water thus pumped and stored is used to irrigate most of the farm area by gravitation. Two check dams have also been constructed to hold the water flowing through the farm and facilitate soil/water conservation under a NATP Project on development and evaluation of soil and water conservation measures and land use systems for sustainable crop production in Western Ghats of Coastal region. Presently, 10 diesel pump sets and eight electrical pump sets are used to lift the water from the river for irrigating the plantations, through use of appropriate sprinklers and drippers depending upon the need and the particular field.



Kumaradhara river



Water storage tank

Since the centre is located in a thickly vegetated region blessed with very high rainfall (400-450 cm), strong winds and frequent power cuts are very predominant. Hence, to overcome the frequent power failures, and facilitate regular day-to-day activities and communication facilities, a 20 KVA generator was initially installed in the year 2002 which recently during this golden jubilee year was replaced with a 62.5 KVA generator. An agro-meteorology station is available inside the campus for recording weather data on daily basis and communicated to the Indian Meteorology Department.



20 KVA generator installed during 2002

To provide good residential facilities to the staff members, four type-I quarters, five type-II quarters, two type-III quarters and one type-IV quarters were constructed for use of officers and staff members serving at the centre. To provide healthy, nutritious food to all the staff members, accordingly a small tiffin room (no loss no profit mode) was initially established and later a permanent canteen building in the year 2002 was constructed with basic facilities for providing unlimited food (lunch) at nominal rates by using locally grown vegetables, which is still continuing.

Currently, all farm and administrative work at the centre is being managed by the team comprising of a Scientist in-charge, an assistant administrative officer/drawing and disbursing officer, a senior technical officer, two technical officers, two technical assistants, one technician and a lower division clerk, and 15 skilled supporting staff members. In addition, an ex-service administrative assistant and contractual manpower for farm activities are used for managing the day-to-day activities. Further to facilitate the important activity of planting material production, a revolving fund project under the Mega Seed Project “Seed production in Agriculture Crops and Fisheries” is operated at the centre, with two SRFs and about 25 other scheme staff, including pollinators, nursery assistants and tractor operators.

CPCRI Research Centre, Kidu is highest major revenue earning centre under the umbrella of ICAR-CPCRI, Kasaragod, generating income from the sale of genetically superior quality planting material of coconut, arecanut and cocoa, apart from selling bulk farm produce of coconut, arecanut, cocoa, black pepper, banana, tender coconuts, cashew and other minor farm produce.

In order to manage farm operations, due importance was given towards farm mechanization. Accordingly, farm implements were purchased and currently the centre is strengthened with two 42 HP tractors, one 26 HP mini-tractor, two off-set disc arrows, one rotavator, one coconut leaf shredder cum pulverizer, one cultivator, one power tiller, 10 weed cutting machines, one chain saw, two power sprayers and a workshop with all basic tools to undertake minor repairs and meet the immediate requirements (detailed in saga of progress). The centre also has a laboratory with a luminescent microscope with image capturing unit, electric balances, desiccators, microwave oven, BODs, refrigerators and other minor laboratory equipment, to facilitate fruit component studies and tender nut analysis for germplasm characterization, and pollen processing and pollen viability studies to facilitate hybridization and seed production.

Seed garden and promoting planting material production

The centre had its beginning as a seed farm and hence has a well-established seed garden for production of quality planting materials of different released varieties and hybrids. A coconut seed garden for production of hybrid seed nuts was established in the year 1972, with alternate rows of tall (WCT) and dwarf (COD) palms, to facilitate natural hybrid seed production by emasculating



Coconut seed garden at CPCRI RC, Kidu

all dwarf palms in the garden. Beginning with the establishment of planting material production plots of coconut, using progenies of elite and pre-potent WCT palms identified at Kasaragod, presently mother blocks of other varieties are also maintained at the centre to produce genetically superior quality planting materials (seed nuts and seedlings) of the released varieties, viz. Kerakeralam, Chandra Kalpa, Kera Chandra, Kalpa Pratibha, Kalpa Dhenu, Kalpa Mitra, Kera Bastar, Kalpatharu, Kalpa Shatabdi, Kalpa Ratna, Kalpa Haritha, Kalpa Jyothi, Kalpa Surya, Kalpasree, Kalparaksha, Chowghat Orange Dwarf and also the parental line Gangabondam Dwarf. The identified palms are also used in hybridization programme for production of the released hybrids, viz. Chandra Sankara, Kera Sankara, Chandra Laksha, Kalpa Sankara, Kalpa Samrudhi and Kalpa Sreshta. During the past two decades, about 7.83 lakh coconut planting material (including 67,938 hybrid seedlings and 7,15,471 seed nuts/seedlings of other varieties), to cover an approximate area of 4,400 ha, have been distributed to farmers/other stakeholders across the country (Table 1). The centre has sufficient parental palms (mother palms) of popular hybrid coconut varieties and can supply pollen for hybridization programme in the country.

In addition to coconut, mother blocks of improved arecanut varieties were established starting from the year 1972. Presently, compact blocks of Mangala, Sumangala, Sreemangala, Swarnamangala, Mohitnagar and Shatamangala as well the dwarf parental line, viz. Hirehalli Dwarf (a dwarf mutant for hybrid seed nut production) are being maintained for producing quality planting material of arecanut. Likewise, high yielding clones of cocoa are planted as biclonal, triclinal and polyclonal orchards for production of hybrid cocoa pods. Besides, the centre also supplies scion materials for production of high yielding cocoa grafts. Over the past two decades about 70.29 lakh and 1.85 lakh of arecanut and cocoa planting materials, respectively, have been distributed to the farmers (Table 2). If estimated, the area occupied by the improved arecanut planting materials supplied in the past two decades accounts for nearly 5,300 ha. Apart from the supply of quality planting materials, the centre also facilitates farmers by providing



Hirehalli Dwarf arecanut

technical inputs and also attempt to update and empower the farmers through different training programmes. The focus is on developing the planting material production activities as a self-financing programme. In addition to sale of planting material to farmers for cultivation, the centre is also facilitating in recent years, the production of breeder/ nucleus seeds of released varieties and parental lines, for meeting the demands of farmers/nurseries.

Conservation of plant genetic resources and utilization for crop improvement

The Kidu farm, diversified into conservation of plant genetic resources following the decision of IPGRI (now Bioversity International), to establish international coconut gene banks under COGENT (Coconut Genetic Resources Network), one each across the five major coconut growing regions of the world, and the Kidu centre of ICAR-CPCRI was identified by the international committee as the location of the International Coconut Gene Bank for South Asia (ICG-SA) in 1995. Initially, a collection of dwarf coconut germplasm from Gujarat, comprising of 60 seedlings of Gudanjali Green Dwarf was planted in a compact block, during 1993, to use them in future breeding programs. As a first step to the establishment of the ICG-SA, Pacific Ocean accessions were brought as embryos from WCGC, Andamans and cultured at ICAR-CPCRI, Kasaragod and 19 embryo-cultured plantlets were

Table 1. Planting material production at CPCRI RC, Kidu during past two decades

Year	Coconut hybrid variety	Coconut other variety	Arecanut seed production	Cocoa planting material
2001-2002	-	72,818	6,65,443	7,547
2002-2003	-	25,970	1,68,851	3,492
2003-2004	-	27,896	1,92,284	1,379
2004-2005	-	26,434	2,50,397	1,927
2005-2006	-	82,250	1,50,286	104
2006-2007	-	50,880	3,18,061	102
2007-2008	-	50,832	2,99,263	7,263
2008-2009	-	49,357	3,88,314	790
2009-2010	17,799	26,539	2,22,528	41,730
2010-2011	16,706	14,521	2,43,920	47,607
2011-2012	16,235	44,799	3,69,295	18,500
2012-2013	13,727	28,578	4,66,345	16,856
2013-2014	9,923	24,277	2,91,110	9,772
2014-2015	9,637	35,539	3,95,680	10,567
2015-2016	13,200	50,170	5,32,630	1,705
2016-2017	21,754	22,764	3,81,026	925
2017-2018	23,359	8,569	5,47,694	1,905
2018-2019	23,195	26,383	3,00,825	9,620
2019-2020	14,885	61,171	4,08,030	2,658
2020-2021	19,454	28,331	4,70,430	587
2021-2022	30,509	45,923	4,03,325	1,507
Total	2,30,383	8,04,001	74,65,737	1,86,543

planted at Kidu farm during 1996. In the subsequent year (1997), conservation of 17 coconut accessions, including accessions of exotic and indigenous origin, regenerated from palms available at ICAR-CPCRI, Kasaragod were planted at the centre.

The ICG-SA (now renamed as the International Coconut Gene Bank for South Asia and Middle East - ICG-SAME) was established in an area of 40 ha at ICAR-CPCRI Research Centre, Kidu during 1998. Subsequently, during the period 1998-2005, about 69 selected coconut accessions available at ICAR-CPCRI, Kasaragod were multiplied and planted at Kidu. This includes, 49 accessions listed as designated Indian germplasm under the ICG MoU and planted in the ICG-SA. Some of the Pacific coconut accessions maintained at World Coconut Germplasm Centre, Andaman are also planted at this centre. Subsequently, *in vitro* embryo cultured plants of exotic accessions collected as embryos through prospection from the Indian Ocean Islands of Mauritius, Madagascar, Seychelles, Maldives, Comoros and Reunion, under the COGENT-ADB funded project on 'Strengthening the capability of International Coconut Gene Bank for South Asia' were also field planted. During 2004, *in vitro* embryo cultured plants of four accessions from Sri Lanka and 10 accessions from Bangladesh were planted in the field gene bank. Subsequently, under the project NATP on Plant Biodiversity (NATP-PB) namely, 'Enrichment of National Coconut Germplasm collection from Lakshadweep and A&N Islands', several exploration trips to different coconut growing areas of the country were undertaken and the collected germplasm were conserved in the national field gene bank (NCGB) at the centre (Table 2).



General view of Coconut Gene Bank at ICAR-CPCRI RC, Kidu

Germplasm thus conserved are being characterized at morphological, molecular and biochemical level for better utilization in crop improvement programmes. During 2016-21, about 62 conserved accessions have been characterized at morphological, molecular and biochemical level. A specific SSR marker for spicata type has been identified. So far, about 21 improved varieties of coconut including hybrids have been developed and released for commercial cultivation.

Table 2. Indigenous coconut germplasm resources conserved in NCGB of RC Kidu

Place of collection	No. of accessions
Assam	4
Kerala	30
Tamil Nadu	7
Andhra Pradesh	5
Goa and Maharashtra	8
Odisha	14
West Bengal	12
A&N Islands	58
Lakshadweep Islands	26
Total	164

Along with germplasm conservation, hybrid evaluation trials have also been planted at Kidu since 1996. A coconut hybrid evaluation trial (HET) with six different hybrid combinations of tall and dwarfs was planted during 1996. Similarly, another hybrid evaluation trial with nine new Dwarf $\times$ Tall combinations is under evaluation since 1998. A dwarf $\times$ dwarf hybrid trial, in diallel mating design, was planted in the year 2003 and is under evaluation. Another hybrid evaluation trial involving 23 D $\times$ T hybrid combinations was planted during 2014. Promising hybrids have been identified for further evaluation and varietal development. Work on development of inbred lines in coconut is also in progress, and inbreds have been planted for evaluation at the centre during 2012. In addition, a WCT S₃ population has been planted during 2015.



Hybrid evaluation trial (1996)

In addition to coconut, cocoa evaluation trials have also been planted for identification of promising clones/hybrids. A comparative yield trial has been initiated in Kidu with nine clones during the year 1986-87. An experiment to study drought tolerance in cocoa was also conducted at Kidu. Cocoa Progeny Trial IV, with nine hybrids and seven parents was evaluated for high yield and drought tolerance during 1991. Subsequently, the Cocoa Progeny Trial V, comprising of 18 hybrid

combinations, involving high yielding and drought tolerant lines was also planted. During the year 2016, RC Kidu was also identified as an alternate conservation site for cocoa genetic resource. Cocoa accessions identified for conservation were multiplied at Regional Station, Vittal and planted at Kidu during 2016. Presently, the alternate gene bank of cocoa at Kidu centre, conserves 64 core cocoa germplasm accessions.

Other Research activities and major contributions

During the initial years of inception of this farm, spacing trials were conducted with 2360 West Coast Tall (WCT) palms, planted under different method of planting as well as different spacing, viz. Square method (6.5 m × 6.5 m, 7.5 m × 7.5 m and 8.5 m × 8.5 m), triangular method (7 m, 8 m and 9 m), single hedge method (4 m × 8 m, 4 m × 9 m, 5 m × 8 m, 5 m × 9 m, 6 m × 8 m and 6 m × 9 m) and double hedge method (4 m × 5 m × 9 m, 5 m × 5 m × 8 m, 5 m × 5 m × 9 m, 4 m × 6 m × 9 m, 5 m × 6 m × 8 m and 5 m × 6 m × 9 m) and from the study, optimum spacing for coconut has been

standardized to 7.5 m × 7.5 m (square method).

The flora of the gene bank area has been studied and documented for sharing information during germplasm exchange and to identify indigenous local medicinal plants for possible inclusion in the location-specific coconut cropping systems.

Research on soil and water conservation using engineering measures on the production and productivity of coconut per unit area was conducted, under the project 'Development and evaluation of soil and water conservation measures and land use systems for sustainable crop production in Western Ghats of Coastal region.' Results from the study indicated that in slopes of 14 to 16%, providing bunds with coconut husk and planting pineapple on the bund borders will reduce soil erosion, conserve soil moisture, reduce soil nutrient loss and increase the coconut yield in coconut-based cropping systems, even under rain-fed conditions.

The Kidu centre was one of the 11 centres chosen for the AP Cess fund project on studying 'Variability in content and composition of coconut oil due to genetic

Table 3. Golden Jubilee Celebrations of ICAR-CPCRI, RC, Kidu

Title of the programme	Date	Beneficiaries
Golden jubilee inaugural event Farmers Scientists Interface Programme	10/01/2022	150 Farmers
Recent advances in coconut and arecanut production and protection technologies	10/01/2022	
Multispecies cropping system in arecanut	25/01/2022	130 Farmers
Craft of cocoa bean processing and bean to bite chocolate preparation from Cocoa: An initiative for women empowerment	05/02/2022	50 Women
Six days non-residential skill-oriented training programme on Coconut Handicraft training programme - to empower unemployed rural youths of backward communities	09/03/2022 to 14/03/2022	15 Youths
Six days non-residential Coconut tree climbing training programme	09/03/2022 to 14/03/2022	20 Youths
Advances in management of pest and diseases in Arecanut	28/03/2022	50 Farmers
Demonstration of palm invasive whitefly management using entomopathogenic fungi, <i>Simplicillium lanosoniveum</i>	28/03/2022	
Farming Awareness programme to School children of 4 th to 8 th standard (Government School, Kaikamba)	08/04/2022	41 Children
Value added products and Neera tapping: A profitable opportunity in coconut sector	13/04/2022	58 Farmers
Advances in production, protection and varietal development in Coconut	20/04/2022	52 Farmers
International Coconut Community Meet as a part of ICG Appraisal Committee Visit	21/05/2022	15 Delegates
Awareness on kitchen gardening and establishment of Kitchen Garden unit in School premises (by CPCRI RC Kidu) to promote usage of locally grown nutritious vegetables for School children of 4 th to 8 th standard (Government School, Kaikamba)	16/06/2022	41 Children
Mushroom cultivation	30/07/2022	51 Farmers
Awareness programme on various government/credit schemes available to farmers, involving officials from NABARD, Hort. Dept. and Bank Agri. Officer	11/08/2022	50 Farmers
Multi-species cropping system and organic farming practices in Coconut and Distribution of Coconut planting materials to SC farmers under SCSP Programme	24/08/2022	70 Farmers
Training programme on Vermi-composting using Coconut and Arecanut based farm residues	13/09/2022	50 Farmers
Mega Kisan Mela	14/10/2022 to 18/10/2022	4000 Farmers
Programmes Planned		
Soilless cultivation and protected cultivation technology	15/11/2022	50 Farmers
Concluding programme of Golden Jubilee Celebration by conducting training programme on "Hybridization techniques and Planting material production in Coconut, Arecanut and Cocoa"	14/12/2022	50 Farmers



Golden Jubilee Inaugural Programme

and environmental factors'. Results indicated variability in fatty acid profiles across varieties and across environments. Kidu was one of the six centres involved in the AP Cess Fund project on 'Characterization of drought in different coconut growing areas and drought management strategies'. From the study, it was proved that soil moisture conservation practices resulted in increased coconut yield.

CONCLUSION

The Kidu centre has had a remarkable journey in the last five decades and has left an indelible footprint in the realm of plantation crops. An attempt is made to take stock of the achievements made and to fine-tune the activities for the future. To commemorate the Golden Jubilee year a series of year-round programme at the ICAR-CPCRI Research Centre, Kidu, for farmers, youth, entrepreneurs and various stakeholders, have been chalked out. The activities were kick-started with the Golden jubilee inaugural "Farmers Scientists Interface Programme" and training on 'Recent advances in coconut and arecanut production and protection technologies' conducted on 10.01.2022 with Sh. Mohan Ram Sulli of the Kukke Subramanya Temple Managing committee as Chief Guest and Dr. Yadukumar (erstwhile Scientist at RC Kidu and Rtd. Principal Scientist, ICAR-DCR,



Coconut tree climbing training programme conducted at ICAR-CPCRI RC Kidu (2022)

Puttur) as Guest of Honor. Over the last few months, the many activities have been undertaken and (Table 3) some more are envisaged for execution. Interested farmers and stakeholders are encouraged to visit the institute and the centre and enrich themselves with the experiences.

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