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Prospect of cashew cultivation in Odisha: A review

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Abstract
Cashew (*Anacardium occidentale* L.) is a tropical tree introduced to India by Portuguese during 16th century for the purpose of soil conservation and can be grown in waste land. Then onwards it's become a major cash earning crop for India and cashew nut is the most valuable processed nuts traded on the global commodity markets. In Odisha most of the coastal regions occupied with cashew plantation but the productivity of cashew in Odisha as well as India is too low. Generally, cashew grown areas of Odisha is covered with seedling origin plants and no proper care and management has been taken out by the farmers to get and to maximize the yield per unit areas. So, in this paper discussion has done about benefits of cashew cultivation and to increase the productivity of cashew in our state. By use of good quality planting materials, adoption scientific cultivation methodology, use of technology after all awareness of cashew grower can increase production of cashew as well as strengthen the livelihood of farmers.

Keywords: Cashew, productivity, quality planting materials, care and management, livelihood

Introduction
Cashew (*Anacardium occcidentale* L.) belongs to family *Anacardiaceae*. It was introduced to India by the Portuguese travellers during 16th century (Agnolioni and Guilians, 1977) [1]. The term 'Cashew' has originated from the Brazilian name 'acajaiba' and the Tupi name 'acaju', which the Portuguese converted into 'caju' and is commonly known as 'kaju' in India. The name given to cashew by the Tapi Indians of Brazil (Bal, 2006) [2]. It is called Parangi and/or Portuguese nut in Kerala (Singh, 1996) [5] and 'Lanka Beeja' in Odisha assuming its introduction from Sri Lanka, and 'Mundiri' indicating the shape of the nut in Tamil Nadu. It is one of the most valuable processed nuts traded on the global commodity markets and is also an important cash crop. It has the potential to provide source of livelihood for the cashew growers, empower rural women in the processing sector, create employment opportunities and generate foreign exchange through exports.

Importance of cashew
- Soil conservation
- High nutritive value
- Afforestation measure
- Remunerative crop
- Value addition
- Export potential (kernels, cashew nut shell liquid)

Area and production of cashew
India produces about 0.77 million MT of cashew from an area of 1.04 million hectares with a productivity of 0.7 MT/ha. The major cashew growing states of India are Maharashtra, Andhra Pradesh, Odisha, Kerala, Karnataka, Tamil Nadu, Goa and Gujarat. In Odisha cashew can be grown in the districts of Khurda, Ganjam, Koraput, Nabarangapur, Puri, Dhenkanal, Cuttack, Jajpur, Nayagarh, Rayagada, Gajapati, Angul, Sundargarh, Mayurbhanj. Total area under cashew cultivation in Odisha is 1.83 lakh ha. Having production potential of 0.93 lakh Metric tonnes and productivity of 513 kg ha^{-1} (DCCB, 2017). India exports 83302 metric tons of cashew kernel worth Rs. 5168.78 crores and 11422 metric tons of cashew nut shell liquid (CNSL) worth Rs. 44.00 crores annually (DCCB, 2017). India exporting nearly 42% of the world export of cashew. It is contributing 0.35% of total export earning of the country.

Why cashew cultivation is most suitable in Odisha?
1. **Favourable soil and climatic condition:** Cashew can be cultivated in all type of soil. Generally, well drained, red sandy loam and light coastal soil with high water holding capacity and rich in organic matter is preferred. Ideal temperature for cashew cultivation

is 22.5 ^{0}C to 27.5 ^{0}C with at least 8 to 9hr sunlight from December to May and requires rainfall from 600 to 1500mm/annum

2. **Scope for Area Expansion:** The present area under cashew is about 1, 80,410 ha. but there is scope for taking up cashew plantation over more than 10 lakh ha. in the state. In area expansion programme, government is planning to take up cashew plantation in another 75,000 ha. area by 2019-20 to meet the short fall in cashew nut production (34,500 ton) in the state.

Strategies are to be adopted to increase cashew area in the state

- Cultivable waste lands can be utilized for cashew plantations by different government agencies.
- Awareness must be created among all the players (farmers, processors and entrepreneur) in cashew sectors through circulation of leaflets and booklets on improved cultivation practices.
- Technology dissemination to the rural youth through training, demonstration and electronic media.
- Recruitment of Cashew sevak at district level for two years to promote awareness.
- Formation of farmer groups of common interest for holistic development.

Availability of quality planting materials

The OSCDC Ltd has established 17 number of cashew clonal nurseries in the state. It produced around 30 lakh of high yielding varieties of cashew for the year 2014-15. The agency becomes a front runner in production of quality planting material both inside and outside the state. Softwood graft of cashew varieties: Jagannath (BH 6), Balabhadra (BH 85), BPP-8(H 2/16), Dhana (H-1608), Vengurla-4, V-9 (H-303) are recommended for the region.Grafts of age 6 months to 1 year old are preferred for planting.

Availability of region specific cashew varieties

Table 1: Following Cashew varieties are recommended for cultivation in the state of Odisha.

SL. No	Varieties	Special features
1	Bhalabadra	Early flowering; Potential nut yield: 2 ton ha^{-1} ; Kernel grade: W240
2	Jagannatha	Medium duration; Potential nut yield: 2 ton ha^{-1}; Kernel grade: W180
3	BPP-8	Early flowering ; Potential nut yield: 2 ton ha^{-1} ; Kernel grade: W210
4	Dhana	Medium duration; Potential nut yield: 2 ton ha^{-1} ; Kernel grade: W210
5	Vengurla- 4	Medium duration; Potential nut yield: 2 ton ha^{-1}; Kernel grade: W240
6	Vengurla -7	Early flowering; Potential yield : 2 ton ha^{-1}; Kernel grade : W180
7	Vengurla-9	Medium duration; Potential nut yield: 2 ton ha^{-1} ; Kernel grade: W210
8	NRCC Sel-2	Early flowering : Potential nut yield:2 ton ha^{-1} ; Kernel grade : W210
9	H-68	Medium duration: Potential nut yield:2 ton ha^{-1}; Kernel grade :W240

Standardize production technology

i. Nutrient management

Manures and Fertilizers promote maximum growth of the plant and advance the onset of flowering in young plants. The recommended dose of manures and fertilizers for cashew in the Odisha is 500g N (1.1 kg urea), 250g P_2O_5 (1.25 kg rock phosphate), 250g K_2O (0.41 Kg of murate of potash) per plant per year. Yield increase up to 50% has been recorded by recycling of organic biomass obtained from cashew orchard. From one hectare cashew orchard 5.5 tonnes of biomass can be available. This will produce about 3.5 tonnes of compost or vermicompost.

1. **High Density planting:** The recommended spacing for cashew at present is 7.5m×7.5m or 8.0m × 8.0m which contain 175 and 156 plants/ha. So High density planting with 4.0 m X 4.0 m (625 plants/ha) or 5.0 m X 5.0 m (400 plants/ha) performed higher yield and after 7 years of planting the yield increased to 2 to 2 ½ times. Efficient utilization of land is possible through high density planting. High density planting is more suitable for soils with low fertility. It also reduces the weed population due to better land coverage.
2. **Soil and water conservation Measures:** Catch pit, modified crescent bunds and husk burial are best method of soil and water conservation. Preparation of catch pit of 2m long, 30cm wide and 45cm depth is made across the slope at a distance of 2 m above the trunk of plant at peripheral end of terrace is very much helpful for conservation of soil as well as moisture. Modified crescent bund of size 6m length, 1m width and 0.5m height and trenches of size 5m length, 1m width & 0.5m depth in middle of 4 plants filling with coconut husk are found beneficial for conservation of soil and water in hilly areas. Rejani and Yadukumar (2010) [4] concluded that modified crescent bund and coconut husk burial were superior which reduced the annual runoff (22.3 and 20.4% of the annual rainfall compared to 36.9% of the annual rainfall in control), soil loss (47 and 49% of control) and nutrient loss. It increased the mean soil moisture content, growth of plants, yield of cashew (6.45 and 6.60 t/ha respectively compared to 4.88 t/ha in control for the first 5 harvests) and net profit from cashew garden (40% more than control).
3. **Water management:** Cashew is cultivated as a rainfed crop. However some Progressive farmers of Dhenkanal district are irrigating the crop through dug well during early stages of plant growth. Constructions of shallow bunds in the sloppy lands have been practiced by some of cashew farmers as measures of water and soil conservation practices in Koraput and Rayagada district of Odisha. Mishra *et al*. (2008) [3] observed that application of 80% irrigation water through drip irrigation with black LDPE mulch increases the number of flower per panicle, nut weight and number of nuts per hactor.
4. **Intercropping in Cashew:** Intercropping in cashew plantation is not a very common practice of Odisha. However in the recent year it is observed that the tribal people are growing inter-crops like Maize, Arhar, Groundnut, Sweet potato etc. Recommendation of AICRP on Cashew, Bhubaneswar, under normal spacing (200 plants ha^{-1}) of cashew based inter-cropping system; Colocasia gave maximum return per hectare after 3 years along with the main crop followed by Brinjal, Okra and Cowpea. Promotion of intercropping in the inter-space of cashew can increase the net return per hectare.

Intercultural operation during rainy season to the intercrops reduces weed population, conserve soil moisture and add net income to the farmers. Intercrops like pineapple, turmeric, Colocasia, elephant foot yam, cucurbits, legume crops can be promoted in this region.

5. **Crop Protection: Cashew stem and root borer (***Plocaederus ferrugineus)* Cashew stem and root borer (CSRB) is most important insect pest of cashew in the state. Old cashew plantation of seedling origin plants found in the districts of Ganjam, Nayagarh and Khordha are more prone to CSRB attack. On an average of 4-6 % trees are infested by CSRB attack. On an average 4-6% trees are infested by CSRB causing 1-2 % mortality of plants annually, particularly in coastal belt of Odisha.

Management

- Swabbing the bark with carbaryl 50 WP@ 2 g/lit.
- Twice a year before the onset of South West Monsoon (March – April) and after cessation of monsoon (November) painting of coal tar + kerosene mixture (1:2)
- Swab the tree with neem oil 5 % (thrice a year February, May-June and September-October).

a. **Tea mosquito bug (*Helopeltis antonii*):** Tea mosquito bug is the 2nd most important pest of cashew in the state found regularly in areas adjacent to Andhra Pradesh such as Ganjam, southern part of Khordha and parts of Koraput district.
It can be controlled by Proper surveillance for pest damage symptoms during flushing, flowering and fruiting period is essential for the management of this pest. This can be also controlled by chemical pesticide at different period of application such as: First spray- Monocrotophos (0.05%) or λ-cyhalothrin (0.003%) at flushing stage, Second spray: λ- cyhalothrin (0.003%) or Carbaryl (0.1%) at flowering stage and Third spray: Carbaryl (0.1%) at fruit stage.

b. **Thrips (*Rhipiphorothrips cruentatus*):** Adult and Nymph suck the sap from leaves, inflorescence and apples and nuts. The leaves become pale brown, scab on floral branches, apples and nuts, forms corky layers on the affected parts. There will be shedding of leaves and stunted growth of trees.
It can be managed by spraying of Monocrotophos @ 1.5 ml / lit.

6. Ample opportunity for processing industries in the state

- Ample quantity of Raw Cashew Nut (RCN) available in Odisha.
- Availability of rural manpower, basically women do the processing job.
- Nut quality of Odisha is highly preferred by users because of its taste and quality
- More than 90% of the RCN harvested in Odisha are organic. Organic products have greater demand overseas which cab tapped in order to earn more revenue.
- Processing potential can be enhanced with modernization.

7. Availability of rural empowerment

Harvesting and processing of cashew is a very tedious job which require huge amount of man power. But in Odisha due to plenty availability of man power, the operation such as harvesting, processing of cashew is very easy.

8. Good transport system

Presence of well connected road from urban to rural area makes it easy for transport of raw material to processing industry and distance market for the processed cashew.

Causes of low productivity of cashew nut in Odisha

- Varieties having poor genetic potential.
- Closed planting of cashew varieties.
- Poor orchard management practices.
- Damage due to hailstorm during flowering and fruiting stage.
- Non adoption of plant protection measures
- Most of plantations in the state are very old and unproductive.
- Lack of awareness about the latest technologies of cashew cultivation
- Many of cashew plantations possessed by OSCDC/OFDC belong to Forest Kissam.

How to increase the Production and productivity of Cashew in Odisha

- Development of new cashew plantation with high yielding varieties.
- Adoption of recent technology on cashew cultivation like integrated nutrient management (INM), integrated pest management (IPM) and mechanization.
- Planting more than one variety in commercial cultivation.
- Timely supply of cashew grafts at farm rate.
- Production and distribution of planting materials by promoting model cashew nurseries and its accreditation.
- Rejuvenation of existing old cashew plantations by top working.
- Promotion of suitable package of practices for various agro-climatic zones of state
- Transfer of Technology through orientation, training, frontline demonstration etc.
- Convergence with various Government sectors such as NHM, MGNREGS, Jalanidhi, PMKSY and RKVY for development of cashew sector in the state.

Research need of the state

- Development of cashew varieties having short flowering and fruiting phase.
- Development of high yielding varieties with export grade kernels.
- Development of dwarf and compact varieties suitable for high density planting system.
- Rejuvenation technique for old and senile cashew orchard.
- Use of micro-nutrient for quality kernel.
- Standardization of agro-technique for high density planting with micro-irrigation.
- Development of IPM for Tea mosquito bug and other pest complex of cashew.
- Advanced technologies for early detection of CSRB (cashew stem and root borer) in cashew plant as CSRB is a major problem in cashew plantations of the state.

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