

ECONOMICS AND YIELD PERFORMANCE OF SOME AGRICULTURAL CROPS UNDER CASHEW BASED HORTI-AGRICULTURAL AGROFORESTRY SYSTEM IN KONKAN

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Abstract: A field experiment was conducted at AICRP on Agroforestry farms at Wakavali, Dr.B.S.K.K.V., Dapoi, during years 2007 to 2014 in an cashew based horti-agricultural agroforestry system consisting of *Anacardium occidentale* L. as sole tree species planted in Kharif-2007 at spacing of 8m X 8m and four agricultural crops viz. *Eleusine coracana*, *Panicum miliaceum*, *Guizotia abyssinica* and *Vigna Mungu*. The maximum yield were achieved by Cashew with Proso millet 12.95 q/ha. Followed by Cashew with Finger millet 11.71 q/ha. However in case of economically beneficial with B:C ratio cashew with niger observed highest benefit cost ratio of (1:1.07). *Anacardium occidentale* + *Guizotia abyssinica* based horti-agricultural system may be preferred more beneficial under rainfed condition in Konkan region.

Keywords: Horti-agricultural system, Yield, Economics, Cashew.

Introduction: Konkan is a resource-rich region of Maharashtra state. Its five districts stretch 720 km along the Arabian Sea and on its other flank are the hills of the Sahyadri range. This strip of mostly hilly land, which at its broadest point is not more than 100 km wide, receives an average of more than 3500 mm of monsoon rain. Indeed the region gets more than enough rainfall but has no perennial water source. In Konkan region most of the farmers are interested in planting more fruit trees on their farms; cash generation is a major reason for their interest. Cashew is generally a spreading type of tree crop and requires lot of space for its canopy spread. When the planting is recommended at a spacing of 8mX8m, the plants take minimum 6-7 years to cover the entire allotted space in the initial years such space can be made use of for planting suitable intercrops which would help in generation of additional income, conservation of soil and moisture and utilization of space and other natural resources more effectively in the juvenile stage of orchard life. The prime aim of raising any tree crop under field condition is generally to make profit on capital investment (Rawat 1989). The overall goal of raising tree crops along with agricultural crops in farm lands is to increase production, to generate a sustained agricultural product base, to reduce environmental damage, and to raise the standard of living of the farmer (Betters 1988). Economic analysis helps a farmer to make decisions about allocation of scarce resources in a rational way in order to meet the targeted objectives (Hoekstra, 1990). Depending on soil and climatic conditions and local situations agricultural crops like Finger millet (*Eleusine coracana*), Proso millet (*Panicum miliaceum*), Niger (*Guizotia abyssinica*) and Black gram (*Vigna mungo*) those may suitable are selected for intercropping. Intercropping trees crops during the establishment phase with food crops is an age-long practice in the tropics. The benefits of such a practice may include food security for household,

income generation to partially offset the cost of establishment, weed control and better use of growth resources (Rodrigo *et al.*, 2001, Opoku Ameyaw *et al.*, 2003).

Materials And Methods: The present experiment on economics and yield performance of some agricultural crops under Cashew based horti-agricultural system under rainfed condition in Konkan region was carried out at the experimental farm of All India Coordinated Research Project (AICRP) on Agroforestry at Central Experimental Station, Wakavali, Dr B.S.Konkan Krishi Vidyapeeth, Dapoli, during July 2009 to 2014. The experiment consist of Cashew (*Anacardium occidentale* L.) at spacing of 8X8 m and four agricultural crops such as Finger millet (*Eleusine coracana*), Proso millet (*Panicum miliaceum* L.), Niger (*Guizotia abyssinica*) and Black gram (*Vigna mungo*) were sown. Finger millet and proso millet were sown on raise bed in last week of May and transplanted in main orchard in 1st week of July with a spacing of 15 X 20 cm and Niger and Black gram was sown in 2nd week of June with a spacing of 15 X 45 cm.

The experiment was laid out in Randomized Block Design (RBD) with four replications and four treatments. Land preparation was started with one summer ploughing in the month of May, followed by two Ploughing and laddering. The experimental plot was led out in to small plots of size 21m X 21m for different treatments. At the time of final land preparation well decomposed Farm Yard Manure (FYM) 10 t /ha and fertilizers doses for particular crops was given as per the university recommendations. The yield intercrops were recorded and analyzed as per the procedure described for RBD (Panse and Sukhatme, 1985). Standard error of means i.e. SEM (+) and Critical difference (CD) were calculated at 5 % level of significance and compared the treatments means, wherever 'F' test was found significant.

Result And Discussion: The average productive life span of cashew was found to be 25 to 30 years. It gives economic returns from the fifth year of planting

stabilized at the seventh year, produces economic yield up to the 20th year and then start declining. In the study juvenile cashew plantation was selected.

Sr no	Treatment	2009-10	2010-11	2011-12	2012-13	2013-14	Pooled Average
1	Finger millet	11.33	11.58	11.75	11.07	12.81	11.71
2	Proso millet	8.61	19.09	12.25	11.50	13.30	12.95
3	Niger	1.62	4.72	4.63	4.85	5.13	4.19
4	Blackgram	5.07	5.22	4.37	3.97	3.23	4.37
	SE+	0.256	0.158	3.066	0.229	0.229	0.619
	CD at 5%	0.888	0.547	NS	0.793	0.664	1.788

The pooled average yield of 12.95q/ha was noticed under cashew + proso millet followed by yield of cashew + finger millet 11.71 q/ha (Table no: 1). Yield of different crops under various agroforestry systems has also been reported by various researchers, three wheat varieties grown under *populous deltoids* (Singh

et al., 1993). *Delbergia sissoo* with sesamum (Naugraiya and Singh, 2005) and *Casuarina equisetifolia*, *E hybrid*, *D sissoo* and *Tectona grandis* with ragi, sesamum, black gram and cowpea (Mohanty, *et al.*, 2008).

Sr. No	Name of the crop	Economic returns from crop yield.	Net returns	Benefit Cost ratio (B:C ratio)
1	(T ₂) Cashew + Fingermillet	29978	(-) 5404	1 : 0.85
2	(T ₃) Cashew + Proso millet	33152	(-) 2759	1 : 0.92
3	(T ₄) Cashew + Niger	29330	1,969	1 : 1.07
4	(T ₅) Cashew + Black gram	29781	(-) 212	1 : 0.99

The economic evaluation in terms of return from crop yield, net returns and B:C ratio under tree crop combination ranged from Rs 33,152 to Rs. 29,330. Cashew + Proso millet combination generated highest gross return as compared to other combination. (Table no: 2). The net return of the different treatments varied from, Rs. 1969 to (-) 5404 /ha. Cashew + Niger combination was proved to be the best combination among the other treatments tried from economic return point of view which may due to low labour requirement for Niger cultivation as compare to Proso millet and Finger millet the crops who gave highest gross returns than Niger. The B:C Ratio of different tree crop combination varied from 1.07 to 0.85, it was found highest in Cashew + Niger combination (1:1.07), followed by and lowest in Cashew + Finger millet combination (1: 0.85). This may be attributed to proportionately low labour cost in Niger cultivation in comparison with the other agricultural crops. Overall the economics of niger as intercrop in cashew based horti-agricultural agroforestry system was appreciably higher than sole cropping in juvenile phase of plantation. The higher return form agroforestry systems in comparison to

sole cropping has been reported in coconut based farming system intercropped with rice, millet grain legumes, oilseed crops, root crops, banana, pineapple and chilies (Das.1991). Sunflower pigeon pea and pearl millet raised in *Leucaena leucocephala* (Ramshe *et al.*, 1994), sorghum, ground nut and grass grown under teak and subabul (Mutanal *et al.*, 2006), more ever the higher returns of arable crops like, maize, paddy, fodder maize and sunhemp raised in horticultural crop sapota and silvicultural crops like *E. terelicrnis*, *Albizia molucana*, *C. equisetifolia*, *T. grandis* and *D. sissoo* (Patil *et al.*, 2010) and coconut and guava based multistoried agroforestry system with medicinal crop like *Aloe indica*, *Asparagus racemosus* and *Kaempferia angustifolia* (Bari and Rahim, 2012).

Conclusion: Niger performed better in juvenile phase of cashew cultivation, its proved superiority over the all other intercrops in terms of yield and higher monetary returns with cashew in combination, therefore *Anacardium occidentale* + *Guizotia abyssinica* based horti-agricultural system may be preferred and more beneficial under rainfed condition in Konkan region.

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