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# Performance of ginger in cashew plantation (as intercrop) compared to sole cropping

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**ABSTRACT :** A field investigation was undertaken during 2011-12 to assess the performance of ginger under cashew plantation as intercrop compared to sole cropping in open area. The experiment was laid out in cashew plantation spaced at 6 m × 6 m by utilizing of 16 $m^2$ (4 m × 4 m) area and replicated thrice. Ginger was also grown as sole crop in open area under similar management conditions. Growth of ginger as intercrop in cashew plantation was significantly higher for plant height, pseudostem diameter, number of tillers and leaf area index at 180 DAP. Significantly higher fresh weight of rhizome (137.77 g/ clump), number secondary rhizome (21.05) and clump size (97.40 $cm^2$) was recorded under sole cropping compared to intercropping (103.16 g/ clump, 14.83 and 90.56 $cm^2$, respectively) in cashew plantation. Interception of PAR (Photosynthetically Active Radiation) by ginger crop at 150 days after planting (DAP) as intercrop in cashew plantation was 25774 Lux compared to 29200 Lux in open area.

**KEY WORDS :** Cashew, Ginger, Intercropping, PAR

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Cashew (*Anacardium occidentale* L.) is one of the important commercial plantation and foreign exchange earning crops of the country. Cashew gained importance in hills and plains due to its wide range of climatic and soil adaptability. Available inter space in the perennial crops can be utilized for cultivation of tuber crops, vegetables and annual spices etc. During initial years of plant growth pine apple, papaya, tapioca and vegetable are suggested in cashew plantations of Dakshina Kannada district (Rao and Yadukumar, 1991). Intercropping in perennial plantation is one of the major forms of multiple cropping for increasing the profit and intensifying the plant populations per unit area in available land. In intercropping system, productivity is improved either by efficient interception of available solar energy or by having crop of greater radiation use efficiency (Anonymous, 1979). The climatic conditions of transitional zone of northern Karnataka including Belgaum district (zone-8) is suitable for ginger cultivation. Hence, a scientific approach was made to assess the comparative performance of ginger intercropped in cashew plantation and as sole crop in open area.

## RESEARCH METHODS

A study was conducted at Horticultural Research Station, Kanabargi, Belgaum district, Karnataka during 2011-2012. Kanabargi is situated in northern transition tract (Zone-8) of Karnataka with an annual mean rain fall of 1250 mm and soil of the tract is medium red sandy loamy. Ginger variety Humanabad Local was grown in three replications both under cashew (variety- Vengurle-4) planted in 1992 (as intercrop) and in open area (as sole crop) in a plot of 16 $m^2$ (4m×4m) in the interspace of four cashew trees. Statistical comparison was worked out to find out the statistically significance of results between intercrop and sole crop based on paired 't' test. Observations on growth and yield attributes were recorded on ginger at monthly interval upto 150 DAP. Interception of photosynthetically active radiation (PAR) at noon was studied with the help of digital photometer (Lux meter). Intercepted PAR was calculated by deducting reflected radiation ($Q_R$) and radiation reaching soil surface ($Q_S$) with total radiation ($Q_T$). Recommended cultivation practices were followed for both intercrop and sole crop as per the package of practice of University of Agricultural Sciences, Dharwad (Anonymous, 2009).

## RESEARCH FINDINGS AND DISCUSSION

Observation on the growth parameters of ginger *viz*.,

**Table 1 : Growth attributes of ginger var. Humanabad Local as intercrop in cashew plantation and as sole crop in open area**

| Sr. No. | Growth attributes | 30 DAP | | | 60 DAP | | | 90 DAP | | | 120 DAP | | | 150 DAP | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | IC | SC | t-value | IC | SC | t-value | IC | SC | t-value | IC | SC | t-value | IC | SC | t-value |
| 1. | Plant height (cm) | 8.69 | 7.77 | 2.16 | 26.40 | 23.60 | 3.71* | 40.63 | 38.48 | 0.53 | 45.84 | 42.16 | 1.50 | 54.42 | 48.05 | 3.27* |
| 2. | Pseudostem diameter (mm) | 6.63 | 6.54 | 0.25 | 7.85 | 7.11 | 1.99 | 8.39 | 7.61 | 1.62 | 9.69 | 8.67 | 3.13* | 10.85 | 9.65 | 3.57* |
| 3. | No. of tillers per clump | 1.03 | 0.53 | 10.60* | 1.72 | 1.11 | 3.64* | 2.33 | 1.64 | 3.02* | 4.16 | 3.63 | 3.57* | 7.20 | 5.13 | 6.60* |
| 4. | No. of leaves per plant | 2.33 | 3.43 | 3.23* | 7.80 | 8.46 | 4.58* | 12.33 | 14.40 | 6.20* | 17.06 | 19.00 | 6.18* | 19.46 | 21.63 | 4.56* |
| 5. | Leaf area index | 0.05 | 0.03 | 2.82* | 0.43 | 0.42 | 1.31 | 1.29 | 1.26 | 0.16 | 3.50 | 3.47 | 0.13 | 7.35 | 5.74 | 2.87* |
| 6. | Dry weight of whole plant (g) | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | 36.33 | 28.66 | 2.78* |

DAP – Days after planting IC – Intercrop; SC – Sole crop; (Table t value at P=0.05 is 2.77)
* Significant at 5 per cent level of probability ** Recorded only at harvest

**Table 2 : Yield and yield attributes of ginger var. Humanabad Local as intercrop in cashew plantation and as sole crop in open area**

| Sr. No. | Yield and yield attributes | Intercrop | Sole crop | t-value |
|---|---|---|---|---|
| 1. | Fresh weight of rhizome (g/clump) | 103.16 | 137.77 | 2.83* |
| 2. | Number of primary rhizome per clump | 2.88 | 3.83 | 4.71* |
| 3. | Number of secondary rhizome per clump | 14.83 | 21.05 | 2.94* |
| 4. | Clump size ($cm^2$) | 90.56 | 97.40 | 3.71* |
| 5. | Fresh rhizome yield per plot (kg/ 15 $m^2$) | 10.62 | 13.10 | 3.26* |
| 6. | Fresh rhizome yield (q/ha) | 66.45 | 81.66 | 3.29* |
| 7. | Harvest index (%) | 78.93 | 84.20 | 3.36* |

* Significant at 5 per cent level of probability (Table t-value at P=0.05 is 2.77)

**Table 3 : Mean interception of PAR (Lux) by ginger as intercrop under cashew plantation and in open area as sole crop**

| Days after planting | Ginger as intercrop | | | | Ginger as sole crop | | | |
|---|---|---|---|---|---|---|---|---|
| | $Q_T$ | $Q_R$ | $Q_S$ | $Q_I$ | $Q_T$ | $Q_R$ | $Q_S$ | $Q_I$ |
| 30 | 34820 | 1940 | 8210 | 23804 | 37640 | 2630 | 9560 | 25084 |
| 60 | 36914 | 2220 | 9610 | 24670 | 40974 | 2750 | 14420 | 25854 |
| 90 | 44920 | 3120 | 15370 | 26030 | 47150 | 3670 | 16580 | 26900 |
| 120 | 45850 | 3960 | 13670 | 28020 | 45850 | 3960 | 13670 | 28220 |
| 150 | 40474 | 3140 | 3140 | 25774 | 43470 | 3720 | 10250 | 29200 |
| Mean | 202978 | 14380 | 50000 | 128298 | 215084 | 16730 | 64480 | 135258 |

$Q_T$ - Radiation at the top of the canopy, $Q_R$ - Reflected radiation, $Q_S$ - Radiation at ground level, $Q_I$ - Intercepted radiation
$Q_I = Q_T - Q_R - Q_S$

plant height, pseudostem diameter, numbers of tillers per clump and number leaves per plant are presented in Table 1. At 60 and 150 DAP ginger under both intercropping in cashew plantation and sole cropping in open area was reported statistically significant. Number of tillers per clump and number of leaves per plant were statistically significant throughout the stage of plant growth. At 150 DAP ginger grown under intercropping produced significantly higher plant height (54.42 cm) and number of tillers per clump (7.20) when compared to corresponding data in open area as sole crop (48.05 cm and 5.13, respectively). Pseudostem diameter was significantly higher in intercrop under cashew plantation compared to sole crop, whereas number of leaves per plant was significantly higher in sole cropping at all the stages of growth compared to intercropping in cashew plantation. In ginger higher plant height and number of tillers per clump in tamarind based intercropping situation compared to open area under Arabhavi conditions is also reported by Kumar (2004). In the present study leaf area index values of ginger was significantly higher under intercropping in cashew plantation when compared to sole cropping in open area. Ginger grown under cashew plantation recorded significantly higher leaf area index (7.35) compared to sole cropping (5.74) at 150 DAP. Similarly Shankar and Swamy (1998) obtained higher LAI in ginger under reduced light conditions when grown as intercrop with mango.

Significantly higher fresh weight of rhizome per clump (137.77 g), number secondary rhizome (21.05) and clump size (97.40 $cm^2$) was recorded under sole cropping compared to cashew based intercropping (103.16 g/ clump, 14.83 and 90.56 $cm^2$, respectively) in ginger. Yield of ginger under sole cropping was significantly higher (81.66 q/ ha) when compared to intercropping (66. 45 q/ ha) in cashew plantation (Table 2). Whereas higher harvest index was recorded under sole cropping (84.20 %) compared to cashew based intercropping with ginger (78.93 %). Higher yield of ginger in open area may be due to higher light interception, less competition for nutrient and moisture. Similar results were also reported by Jaswal *et al.* (1993), Jayachandran *et al*. (1992) and Kumar (2004) under different intercropping system.

Interception of Photosynthetically active radiation (QI) was higher in sole cropping (29200 Lux) compared to intercropping (25774 Lux) at 150 DAP (Table 3). Kasturibai *et al*. (1991) also reported about the reduction in light intensity reaching canopy of intercrops due to interception by coconut canopy. Hegde *et al*. (2000) also reported that, interception of PAR by ginger was maximum in open area compared to areca based intercropping with ginger.

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