**Journal of Food Legumes**
**39 (1) 2026: 57-63, 2026**
**DOI: 10.53550/jfl.v39.i1.345**

**Research Paper**

# Commercial potential of speciality corn, groundnut and parching sorghum in pigeonpea based intercropping system in east and south eastern coastal plain of Odisha

PK Panda[1*], PM Mohapatra[1], IOP Mishra[1], S Behera[1], SK Biswasi[2] and BS Nayak[3]

[1]*Nutri-Crops Research Station, OUAT, Berhampur, India*
[2]*RRTTSS, Kirei, Sundergarh, India*
[3]*RRTTS, Bhawanipatna, India*

***Corresponding author e-mail:** pkpanda_69@yahoo.com*

***Received:** July 9, 2025*
***Accepted:** January 9, 2026*

## ABSTRACT

**The present study investigates the commercial potential of speciality corn (sweet corn and baby corn), groundnut, and parching sorghum in pigeonpea-based intercropping systems in Odisha. Pulses are soil-enriching crops, and conversely, corn and parching sorghum are exhaustive, but have much higher economic potential. A combination of both may be a sustainably profitable enterprise for small and marginal farmers. The intercropping of pigeonpea with baby corn in 1:2 proportion (replacement series) gave the maximum system pigeonpea equivalent yield (2461 kg/ha), closely followed by pigeonpea+groundnut in a 1:2 proportion (additive series), which gave PEY of 2448 kg/ha. However, maximum net return (Rs. 97,176/-) and B:C ratio (2.49) was recorded from pigeonpea+groundnut intercropping system. The maximum system Land Equivalent Ratio (LER=1.64) was recorded with the pigeonpea+groundnut intercropping system. This treatment also recorded the maximum monetary advantage index (Rs. 63,366/-). Pigeonpea recorded maximum competition ratio (2.49), Aggressivity (1.66), and relative crowding coefficient (20.63) when intercropped with groundnut. Pigeonpea was found as the dominant component, and intercrops are dominated through all intercropping combinations. However, pigeonpea+ groundnut (1:2) and pigeonpea+baby corn (1:2) intercropping are recommended for the farmers of the East and south eastern coatal plain agroclimatic zone of Odisha for higher profitability, depending on market demand.**

***Key words**: Aggressivity, Competition functions, Equivalent yield, Intercropping, Land Equivalent Ratio, Parching sorghum, Pigeonpea, Speciality corn*

## INTRODUCTION

Commercialisation of agriculture in a mission mode has immense potential for enhancing farmers' income conspicuously. Diversification of cropping pattern with replacement of low profitable cops by higher ones and a market-led crop enterprise may be helpful for small and marginal farmers for enhancing their standard of living. Pulses are climate-smart, nutrient-efficient, low-duty crops and play an important role in sustaining intensive agriculture by improving soil properties. Pigeonpea, being a wide spaced long duration crop, is suitable for intercropping with several high-value crops. Kushwaha and Mehta (2023) reviewed the pigeonpea-based intercropping system and found that many legumes, cereals and oilseed crops are compatible and having synergistic association. Garuda *et al*. (2018), studied the pigeonpea-based intercropping system under different land situations and found the maximum pigeonpea equivalent yield (PEY) with the pigeonpea+mungbean combination. Kathmale *et al*. (2014), recommended pigeonpea+groundnut intercropping at 1:3 row ratio for maximum productivity, profitability and rainwater use efficiency. Speciality corns like sweet corn and baby corn are gaining increased popularity in urban areas. In the changing dietary preferences, parching sorghum has ample scope for creating a market for it. Sweet corn value-added dishes and products have attained popularity. Similarly, baby corn is gaining consumers' preference among the new generation urban inhabitants. Parching sorghum, also known as 'hurda' in Maharastra is a popular delicacy made from roasting tender sorghum grains and could be a new introduction in Odisha. These crops can be a profitable enterprise for farmers of peri urban area. Millets, being nutricereals and low-duty crops, are considered potential crops for diversification in cropping systems. Intercropping is an agronomic management practice for better resource management, higher productivity, and profitability per unit land area during a specific period. Pulses are eco-friendly crops and are essential for maintaining soil fertility. Speciality corn, like sweet corn and baby corn, parching sorghum, and groundnut, have much higher economic potential. A combination of these high-value crops with the pulses may be a sustainable as well as profitable enterprise for small and marginal farmers, especially in peri-urban areas. Intercropping is an insurance against climatic aberrations and an adoption strategy for reducing the impact of climate change. It reduces biotic stresses through the push-pull concept and enhances profitability per unit land area during a specific period. Dubey *et al*. (1991), studied intercropping in short-duration pigeonpea. Panda *et al*. (2022), studied the prospects of vegetable crops in pigeonpea-based intercropping systems in Odisha. The development of a cropping system is necessary for increasing returns per unit area and meeting the nutritional and economic requirements of the local populations (Altieri 1999). Intercropping systems for sustainable tropical agriculture is expected to with stand a wide range of ecological and climatic factors (Doubi *et al*. 2016). However, it is well established that different species growing together in the same place compete for nutrients, water, and light (Ghose 2004). Jayswal *et al*. (2024), reported the superiority of sweet corn over baby corn as an intercrop with pigeonpea at Ranchi, Jharkhand. Pradeep Kumar *et al*. (2022), studied pigeonpea and maize intercropping system at TCA research farm, Dholi, Bihar, and advocated 120% RDF with conservation tillage for high monetary return. Kumawat *et al*. (2017), through an extensive review, found that intercropping with pigeionpea has potentiality for doubling farm income. At UAS, Bengaluru, Devika *et al*. (2024), recorded maximum net monetary return (Rs. 2,96,750/ha) with B:C ratio of 4.61 with Pigeonpea+sweet corn intercropping system (1:2). Hence, an effort has been made for the evaluation of the economic feasibility of pigeonpea+speciality corn and parching sorghum intercropping systems underrainfed *kharif* upland conditions in coastal Odisha. The trial was targeted for the horizontal expansion of pulses for sustainable soil fertility and speciality corn and parching sorghum for the economic security of small and marginal farmers of peri-urban areas.

## MATERIALS AND METHODS

### *Experimental site and weather conditions*

A field experiment was conducted over three consecutive years (2021-22 to 2023-24) at the Nutri-Crops Research Station, OUAT, Berhampur-761001, which comes under the east and south eastern coastal plain agro-climatic zone of Odisha, situated at 19.36 $^{o}$N latitude, 84.77 $^{o}$E longitude, and an altitude of 34m above the mean sea level (MSL). The soil of the experimental site was sandy loam in texture, slightly acidic with a pH of 6.2, having medium organic carbon (0.54%), medium available nitrogen (288.7 kg/ha), medium available phosphorus (18.33 kg/ha), and medium available potassium (191 kg/ha). During the crop growth period (June to December) a total rainfall of 1085 mm (mean of three years) was received in 48 rainy days (mean of three years). Monthly rainfall (year-wise) and other meteorological parameters such as rainy days, maximum and minimum temperature and humidity (mean of three years) are presented in Table-1.

### *Experimental design*

The experiment consists of 9 treatments, including five sole crops and four intercropping combinations viz. $T_1$:Sole pigeonpea cv. 'BRG-5'; $T_2$: Sole groundnut cv. 'Devi'; $T_3$: Sole sweet corn cv. 'Misti'; $T_4$: Sole baby corn cv. 'G5414'; $T_5$: Sole parching sorghum cv. 'PDKV Hurdakartiki' $T_6$: Pigeonpea+groundnut (1:2); $T_7$: Pigeonpea+sweet corn (1:2); $T_8$: Pigeonpea+Baby corn (1:2); $T_9$: Pigeonpea+parching sorghum (1:2) were laid out in randomized block design with three replications. Row spacing of sole crops of pigeonpea was maintained as 90cm. Intercrops such as sweet corn, baby corn, and parching sorghum were taken as replacement series with uniform row spacing of 60cm *i.e.*, row spacing for two rows of pigeonpea was 180cm. Groundnut sown in an additive series with 30cm row spacing without any compromise with pigeonpea cropping geometry and population. The experiment was conducted under *kharif* rainfed upland conditions. FYM @ 5 tonnes per hectare was applied at the time of land preparation. Recommended fertilizer dose (20:40:20 kg N, $P_2O_5$, $K_2O$ for pigeonpea, 20:40:40 kg N, $P_2O_5$, $K_2O$ for groundnut, and 80:40:40 kg N, $P_2O_5$, $K_2O$ for sweet corn, baby corn, and parching sorghum) has been applied to the sole crops and the proportionate dose as per plant population ratio to the component crops in an intercropping system in furrows. All fertilizer applied as basal in pigeonpea and groundnut, and split application in other crop components. All crops were sown simultaneously during July. Fresh tender cobs of baby corn harvested at silk initiation (55-60 DAS) and dehusked for recording economic yield. Sweet corn harvested at green cob stage (65-75 DAS) and parching sorghum is harvested for young tender grain at milking to soft dough stage (80-90 DAS). Groundnut and pigeonpea were harvested at 115-120 DAS and 175-180 DAS, respectively, at maturity. Observations on the yield of pigeonpea and component crops were taken at harvest, converted to pigeonpea equivalent yield (PEY), and were statistically analysed. Analysis of variance was performed by using the online statistical programme OPSTAT (website link http://www.opstat.somee.com). Comparisons of treatment mean values were performed at P=0.05.

### *Economics and competition functions*

Economics of the treatments were calculated and compared on the basis of the pigeonpea equivalent yield (PEY) for economic feasibility. Minimum support price (MSP) of pigeonpea and groundnut was taken into account. Market prices of sweet corn, baby corn, and parching sorghum were taken, and the means of three years are mentioned in table-3. Grossmonetary return (GMR) from the intercropping system was calculated by multiplying PEY with pigeonpea MSP. Cost of production (COP) was computed for individual treatments. The net monetary return (NMR) was computed by deducting COP from GMR. Benefit cost ratio (BCR) was calculated on the basis of the proportion of GMR and COP.

Competition functions such as land equivalent ratio (LER), monetary advantage index (MAI), competition ratio (CR), aggressivity (A), and relative crowding coefficient (RCC) were calculated as follows.

i) The land equivalent ratio (LER), which is the relative land area under sole crop required to produce the same yield achieved in intercropping, was calculated by using the formula given by Willey and Osiru (1972).

$$LER = LERa + LERb = \frac{Yab}{Yaa} + \frac{Yba}{Ybb}$$

Where LERa and LERb are individual LER of both crops; Yab and Yba are yields of crop 'a' and 'b' respectively in a mixed stand. Yaa and Ybb are the pure crop yield of crop 'a' and 'b' respectively.

ii) The monetary advantage index (MAI) was calculated as suggested by Willy (1979), which gives the absolute value of the genuine yield advantage in intercropping.

$$MAI = Value\ of\ combined\ intercrop\ yield \times \frac{LER - 1}{LER}$$

The higher the index, the better is the cropping system.

iii) Competition ratio (CR) is the ratio of individual LER of two component crops, but correcting for the proportions in which they were initially sown. It was calculated asunder:

$$CRa = \frac{LERa}{LERb} \times \frac{Zba}{Zab}\ and\ CRb = \frac{LERb}{LERa} \times \frac{Zab}{Zba}$$

Where, CRa and CRb are the competition ratios of crop 'a' in mixture with 'b' and crop 'b' in mixture with 'a' respectively; LERa and LERb are individual LER of both crops; Zba and Zab are sowing proportions of crop 'b' with 'a' and 'a' with 'b' respectively. The competition ratio computed more than one indicates that the crop is dominant in the system.

iv) Aggressivity (A) determines the competitive abilities of the component crops and is calculated as suggested by Mc Gilchrist (1965). It gives a simple measure of how much the relative yield increase in component crop 'a' is greater than that for crop 'b'. If it is zero, then both component crops are equally competitive. Positive value stands for the dominant component and negative value for the dominated, the numerical values of both the crops being the same.

$$Aggressivity\ for\ 'a'(Aab) = \frac{Yab}{(Yaa \times Zab)} - \frac{Yba}{(Ybb \times Zba)}$$

$$Aggressivity\ for\ 'b'(Aba) = \frac{Yba}{(Ybb \times Zba)} - \frac{Yab}{(Yaa \times Zab)}$$

Where Aab and Aba are the Aggressivities of crop 'a' in mixture with 'b' and crop 'b' in mixture with 'a'; Yab and Yba are yields of crop 'a' and 'b' respectively in mixed stand., Yaa and Ybb are the pure crop yield of crop 'a' and 'b' respectively. Zba and Zab are sowing proportions of crop 'b' with 'a' and 'a' with 'b' respectively.

v) Relative crowding coefficient (RCC) indicates whether a species grown in a mixture population has produced more or less yield than expected in a pure stand (de Wit, 1960).

$$RCCa = Kab = \frac{(Yab \times Zba)}{(Yaa - Yab)Zab}$$

$$RCCb = Kba = \frac{(Yba \times Zab)}{(Ybb - Yba)Zba}$$

RCCa+b= Ka+b= Kab +Kba

Where, Kaband Kba are the Relative crowding coefficients of crop 'a' in mixture with 'b' and *vice versa*; Yab and Yaa are yields of crop 'a' in mixed stand and pure crop, respectively; Yba and Ybb are yields of crop 'b' in mixed stand and pure crop, respectively. Zba and Zab are sowing proportions of crop 'b' with 'a' and 'a' with 'b' respectively. Ka+bis the RCC of the system. When K>1, there is a yield advantage; when K = 1, there is no difference and when K < 1, there is a yield disadvantage.

## RESULTS AND DISCUSSION

### *Yield and pigeonpea equivalent yield*

Year-wise yield (kg/ha) of intercrops and pigeonpea were presented in Table 2. The data showed that there was very little year-to-year variation in the yield of intercrops. However, the yield of pigeonpea during 2021-2022 was found to be reduced when intercropped with sweet corn and baby corn and stabilized in the next two years. The trend was similar during each year of experimentation. This justifies the stability of the systems. The yield of intercrops was converted to pigeonpea equivalent yield considering the sale rate proportions for comparison (Table 3). Pooled data of three years (2021-22, 2022-23, and 2023-24) revealed that the yield of individual component crops in intercropping combinations was always less than their respective yield in sole crops. Similar results were reported by Panda *et al*. (2003), in the case of pigeonpea and yambean intercropping. The result also corroborated the findings of Ahlawat (1998) and Das *et al*. (2002). The percentage of reduction in grain yield of pigeonpea in the intercropping system was found to be minimum (8.96%) with groundnut in a 1:2 proportion and maximum (59.61%) with sweet corn in a 1:2 proportion, as compared to the sole crop yield. Reddy *et al*. (1993), also reported that intercropping did not reduce the pigeonpea yield significantly. However, the combined yield expressed as pigeonpea equivalent yield was always found higher than the sole crops of both components in the intercropping system, except for sweet corn, where the sole crop yield (PEY=2422 kg/ha) was found higher than the intercropping system (2327 kg/ha). Among intercrops, pigeonpea+baby

**Table 1**. Monthly meteorological parameters during the crop growing season (2021-23)

| Month | Rainfall (mm) | | | | Rainy day | Temperature (2021-23) | | Relative humidity (2021-23) | | Solar radiation (MJ/m²/day |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2021 | 2022 | 2023 | Mean | 2021-23 | Tmax (°C) | Tmin (°C) | Rhmax (%) | Rhmin (%) | |
| June | 45 | 40 | 113.7 | 66.2 | 4.7 | 35.2 | 27.6 | 85.6 | 42.2 | 11.58 |
| July | 138.1 | 139 | 241 | 172.7 | 10.3 | 32.2 | 25.4 | 86.4 | 60.8 | 7.21 |
| August | 213 | 319.5 | 82.5 | 205.0 | 10.3 | 31.1 | 25.6 | 87.4 | 66.2 | 6.29 |
| September | 311 | 181.5 | 170 | 220.8 | 9.3 | 31.4 | 24.9 | 91.8 | 65.6 | 7.42 |
| October | 137 | 253.5 | 477.6 | 289.4 | 9.7 | 32.6 | 23.4 | 90.8 | 62.2 | 12.24 |
| November | 249 | 0 | 3.5 | 84.2 | 2.0 | 27.8 | 22.3 | 87.4 | 49.8 | 11.74 |
| December | 69 | 0 | 71 | 46.7 | 2.0 | 26.2 | 19.1 | 90.3 | 37.1 | 9.71 |
| Total | 1162.1 | 933.5 | 1159.3 | 1085.0 | 48.3 | | | | | |

**Table 2.** Year wise yield of intercrops and pigeonpea in intercropping systems (2021-24).

| Treatment | Yield of intercrop (kg/ha) | | | | Yield of pigeonpea (kg/ha) | | | |
|---|---|---|---|---|---|---|---|---|
| | 2021-22 | 2022-23 | 2023-24 | Pooled mean | 2021-22 | 2022-23 | 2023-24 | Pooled mean |
| Sole pigeonpea (PP) | 0 | 0 | 0 | 0 | 1507 | 1497 | 1617 | 1540 |
| Sole Ground nut | 1596 | 1625 | 1632 | 1618 | 0 | 0 | 0 | 0 |
| Sole Sweet corn | 6890 | 6792 | 7076 | 6919 | 0 | 0 | 0 | 0 |
| Sole Baby corn | 1783 | 1802 | 1676 | 1754 | 0 | 0 | 0 | 0 |
| Sole Parching sorghum | 1183 | 1044 | 1242 | 1156 | 0 | 0 | 0 | 0 |
| Pigeonpea + Ground nut (1:2) | 985 | 1216 | 1325 | 1175 | 1325 | 1300 | 1581 | 1402 |
| Pigeonpea + Sweet corn (1:2) | 4913 | 4784 | 4919 | 4872 | 383 | 608 | 874 | 622 |
| Pigeonpea + Baby corn (1:2) | 1332 | 1312 | 1221 | 1288 | 430 | 739 | 959 | 709 |
| Pigeonpea + Parching sorghum (1:2) | 789 | 691 | 885 | 788 | 733 | 598 | 870 | 734 |

corn (1:2) recorded maximum system PEY (2461 kg/ha), closely followed by pigeonpea+groundnut (1:2) proportion (2448 kg/ha). This may be because groundnut was grown in an additive series without reducing pigeonpea population and the lowest yield reduction of pigeonpea, as compared to the sole crop was computed with this combination.

### *Economics*

Economics of individual treatments based on pooled PEY and average MSP of pigeonpea and groundnut for three years, taken into consideration for evaluation of profitability, are presented in Table 3. The price of sweet corn and baby corn is computed as per the local market price and converted to PEY. GMR from the intercropping system was always more than the respective sole crops, except for sweet corn. Panda *et al.* (2003), also found similar results in the pigeonpea-yam bean intercropping system in West Bengal. Maximum GMR (Rs.1,63,238/ha) was recorded with pigeonpea+baby corn in a 1:2 proportion, closely followed by pigeonpea+groundnut in a 1:2 proportion (Rs.1,62,397/ha). However, maximum NMR (Rs.97,176/ha) and B:C ratio (2.49) were recorded with pigeonpea+groundnut in a 1:2 proportion, followed by pigeonpea+baby corn in a 1:2 proportion. This is due to the higher cost of production (Rs.69,300/ha) of pigeonpea+baby corn intercropping system than that of pigeonpea+groundnut system (Rs.65,200/ha). Nevertheless, the sole crop of sweet corn has recorded a higher PEY (2422 kg/ha) than that of the intercropping with pigeonpea (2327 kg/ha). The lowest values of PEY (1440 kg/ha), GMR (Rs. 95,515/ ha), NMR (Rs. 42,415/ha), and B:C ratio (1.80) were associated with the sole groundnut crop. This indicates that during *kharif* season, farmers should take groundnut as an intercrop with pigeonpea rather than a sole crop for higher productivity and profitability.

### *Competition functions*

Different competition functions, such as land equivalent ratio (LER), monetary advantage index (MAI), competition ratio (CR), aggressivity (A), and relative crowding coefficient (RCC), were calculated and interpreted for evaluation of intercropping compatibility of the systems (Table 4). Intercropping of compatible crops always has yield advantages over respective sole crops (Panda *et al*. 2003).

LER of component 'a' (pigeonpea) in intercropping combinations was found to be maximum (0.91) with pigeonpea-groundnut in a 1:2 proportion. Among intercrops (component 'b'), both groundnut and baby corn in a 1:2 proportion registered maximum LER (0.73). This indicates that both component crops of pigeonpea+groundnut system have exhibited their maximum productivity under 1:2 proportion planting geometry, which proved their compatibility. When the LER of the system was computed, pigeonpea:groundnut also registered the highest LER (1.64), showing its compatibility and high productivity. This intercropping combination also registered the maximum MAI (Rs. 63,366/-), which proved its profitability. Though the individual LER of the component crops was found to be less than one, the system LER was always found to be more than one, indicating the yield advantage of the system. The higher the index better the cropping system. A similar result was found by Panda *et al*. (2022).

Individual competition ratios of both the component crops were computed and presented in Table 4. The competition ratio of pigeonpea when sown with groundnut was recorded as the maximum value (2.49), indicating the dominance of pigeonpea over groundnut. CR of pigeonpea in other combinations was also recorded more than one, and on the other hand, all the intercrops recorded less than one value. Thus, it can be assumed that the pigeonpea crop was dominant in the system and the intercrops were dominated.

Aggressivities of crop 'a' (pigeonpea) and crop 'b' (intercrop) were calculated and presented in Table 4. The data indicates that the aggressivity of crop 'a' (pigeonpea) was found to have positive values always, and the maximum (1.66) was recorded with the pigeonpea+groundnut intercropping system. Conversely, the aggressivity of all the intercrops was found to be negative. This indicates that pigeonpea was dominant and intercrops were dominated in the system.

The RCC of a given species in a mixture indicates whether it has produced more or less yield than expected in a pure stand. RCC of pigeonpea (Kab), intercrops (Kba), and the intercropping system (Ka+b) were computed and exhibited in Table 4. The data revealed that pigeonpea has a maximum yield advantage (Kab=20.63) when sown with groundnut in a 1:2 proportion. Among intercrops, baby corn registered the maximum coefficient (1.36) when sown in 1:2 proportions with pigeonpea. RCC of pigeonpea and respective

**Table 3.** Commercial potential of pigeonpea+speciality corn and parching sorghum intercropping systems (2021-24)

| Treatment | Yield of intercrop (kg/ha) | PSEY (kg/ ha) | Yield of PP (kg/ ha) | % reduction of PP yield | Total PSEY of system (kg/ha) | Gross monetary return (Rs/ha) | Cost of production (Rs/ha) | Net return (Rs/ha) | B:C ratio |
|---|---|---|---|---|---|---|---|---|---|
| Sole pigeonpea (PP) | 0 | 0 | 1540 | 0 | 1540 | 102148 | 44600 | 57548 | 2.29 |
| Sole Ground nut | 1618 | 1440 | 0 | - | 1440 | 95515 | 53100 | 42415 | 1.80 |
| Sole Sweet corn | 6919 | 2422 | 0 | - | 2422 | 160651 | 67900 | 92751 | 2.37 |
| Sole Baby corn | 1754 | 2385 | 0 | - | 2385 | 158197 | 71200 | 86997 | 2.22 |
| Sole Parching sorghum | 1156 | 1572 | 0 | - | 1572 | 104271 | 46300 | 57971 | 2.25 |
| Pigeonpea + Ground nut (1:2) | 1175 | 1046 | 1402 | 8.96 | 2448 | 162376 | 65200 | 97176 | 2.49 |
| Pigeonpea + Sweet corn (1:2) | 4872 | 1705 | 622 | 59.61 | 2327 | 154350 | 65800 | 88550 | 2.35 |
| Pigeonpea + Baby corn (1:2) | 1288 | 1752 | 709 | 53.96 | 2461 | 163238 | 69300 | 93938 | 2.36 |
| Pigeonpea + Parching sorghum (1:2) | 788 | 1072 | 734 | 52.34 | 1806 | 119792 | 54000 | 65792 | 2.22 |
| S.E. (m) + | | | | | 97.02 | 6435 | - | | |
| CD (p=0.05) | | | | | 276.2 | 19293 | - | | |
| CV (%) | | | | | 12.8 | 12.8 | - | | |

Price (mean of 3 year) of Pigeonpea grain=Rs. 66.33/kg (MSP); Ground nut with shell=Rs. 59.26 (MSP)

Market Price (mean of 3 year) of sweet corn green cob=Rs. 23/kg ; Baby corn (dehusked)=Rs. 90/kg; Parching sorghum (raw grain)=Rs. 90/kg

Pigeonpea Equivalent yield:1kg ground nut= 0.89 kg; sweet corn green cob= 0.35 kg; baby corn (dehusked)= 1.36kg; parching sorghum (raw grain)=1.36 kg

**Table 4.** Competition functions of pigeonpea+ speciality corn and parching sorghum intercropping systems (2021-24).

| Treatment | Land equivalent ratio (LER) | | | Monetary Advantage Index (Rs/ha) | Competition ratio | | Aggressivity | | Relative crowding coefficient | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LERa | LERb | LER a+b | | CRa | CRb | Aab | Aba | Kab | Kba | Ka+b |
| Sole pigeonpea (PP) | 1.00 | - | 1.00 | - | - | - | - | - | - | - | - |
| Sole Ground nut | - | 1.00 | 1.00 | - | - | - | - | - | - | - | - |
| Sole Sweet corn | - | 1.00 | 1.00 | - | - | - | - | - | - | - | - |
| Sole Baby corn | - | 1.00 | 1.00 | - | - | - | - | - | - | - | - |
| Sole Parching sorghum | - | 1.00 | 1.00 | - | - | - | - | - | - | - | - |
| Pigeonpea + Ground nut (1:2) | 0.91 | 0.73 | 1.64 | 63366 | 2.49 | 0.40 | 1.66 | -1.66 | 20.63 | 1.31 | 21.94 |
| Pigeonpea + Sweet corn (1:2) | 0.40 | 0.70 | 1.10 | 14032 | 1.14 | 0.88 | 0.17 | -0.17 | 1.38 | 1.17 | 2.55 |
| Pigeonpea + Baby corn (1:2) | 0.46 | 0.73 | 1.19 | 26063 | 1.26 | 0.79 | 0.30 | -0.30 | 1.73 | 1.36 | 3.09 |
| Pigeonpea + Parching sorghum (1:2) | 0.48 | 0.68 | 1.16 | 16523 | 1.41 | 0.71 | 0.27 | -0.27 | 1.85 | 1.06 | 2.91 |

Component a=pigeonpea; b= intercrops; LER= Land equivalent ratio; MAI = Monetary advantage index; CR= Competition ratio; Aab= Aggressivity of a in relation to b; Aba= Aggressivity of b in relation to a

Relative crowding coefficient of pigeonpea in mixture with intercrop=Kab, RCC of intercrop with pigeonpea=Kba

intercrops were added for computing the total RCC of the system. The data revealed that the treatment T6 (pigeonpea:groundnut=1:2) registered the highest system relative crowding coefficient (Ka+b) (21.94), showing its superiority and yield advantage over other cropping systems.

## CONCLUSION

Considering higher productivity and profitability for enhancing farmers' income per unit area, intercropping of pigeonpea+groundnut (1:2) and pigeonpea+baby corn (1:2) may be recommended under *kharif* rainfed upland situation of eastern and south eastern coastal plain zone of Odisha, depending on location and market availability. As baby corn is a tender perishable product, it should be taken in peri-urban areas, and the area may be decided as per the market demand. Intercropping of pigeonpea+groundnut (1:2) may be suitable for the small and marginal farmers of those regions where getting a potential market is a constraint. Large commercial farmers may adopt baby corn or sweet corn depending on market demand. However, considering storability and net monetary return, intercropping of pigeonpea+groundnut (1:2) may be recommended, which is also soil and environment friendly.


## ACKNOWLEDGEMENT

The authors are highly thankful to AICRP on Pigeonpea for financial assistance and OUAT, Bhubaneswar for providing necessary facilities for carrying out the research work.


## REFERENCES


Ahlawat IPS. 1998. Production potential of frenchbean (*Phaseolus vulgaris*) based intercropping system in northern plains. Indian Journal of Agronomy **43**: 45-49.

Altieri MA. 1999. The ecological role of biodiversity in agroecosystems. Agriculture Ecosystems & Environment **74**: 19-31.

Das A, Gnanamurthy P and Kumar N. 2002. Effect of vegetable intercropping and source of nutrient on yield attributing characters and yield of pigeonpea (*Cajanus cajan*). Indian Journal of Agronomy **47**: 340-344.

de Wit C T. 1960. On competition. *Verslag land boucokundigeonderzock*. 66: 1-82.

Hall RL. 1974. Analysis of the nature of interference between plants of different species. Concept and extension of the de Wit, analysis of examined effects. Australian Journal of Agricultural Research **25**: 749-756.

Devika AR, Rehman HMA, Lohitaswa HC, Raju BM, Manjunath MH and Navi L. 2024. Evaluation of different pigeonpea based intercropping systems in Alfisols for higher productivity. International Journal of Research in Agronomy **7**(4): 01-04.

Doubi BTS, Kouassi KI, Kouakou KL, Koffi KK, Baudoin JP and Zoro BIA. 2016. Existing competition indices in the intercropping system of Monihotesculenta Crantz and Lagenariasiceraria (Molina) standley. Journal of Plant Interactions **11**: 178-185.

Dubey OP, Garg DC, Dixit JP and Tiwari KP. 1991. Intercropping in short duration pigeonpea. Indian Journal of Agronomy **36**: 253-254.

Garuda HS, Asewar BV, Khazi GS, Khargkharate VK and Gadade GD. 2018. Effect of intercropping systems on pigeonpea equivalent yield under different land configuration. Journal of Pharmacognosy and Phytochemistry **7**(6): 525-527.

Ghose PK. 2004. Growth yield competition and economics of groundnut /cereal fodder intercropping systems in the semi-arid tropics of India. Field Crops Research **88**: 227-237.

Jayswal PK, Karmakar S, Singh CS, Singh AK and Agrawal BK. 2024. Effect of intercropping and nitrogen management o growth and phenology of pigeonpea, sweetcorn, baby corn using nano urea. Pollution Research **43**(1): 90-94.

Kathmale DK, Dhagde SM, Satpute NR, Patil SV, Chary GR, Rao CS, Jadav JD and Kadam JR. 2014. Evaluation of pigeonpea based intercropping systems under semi aridvertisols in scarcity zone of Maharastra. Indian Journal of Dry Land Agricultural Research and Development **29**(1): 27-34.

Kumawat N, Kumar R, Yadav RK, Tomar IS, Sahu YK and Meena BL. 2017. Doubling the farm income through promoting of pigeonpea based intercropping system: A review. Agricultural Reviews **38**(3): 201-208.

Kushwaha A and Mehta CM. 2023. Pigeonpea (*Cajanus cajan* L.) based intercropping systems: A review. International Journal of Plant and Soil Science **35**(18): 1676-1689.

Mc Gilchrist CA. 1965. Analysis of competition experiments. Biometrics **21**: 975-985.

Panda PK, Sen H, Mukherjee A and Satpathy MR. 2003. Studies on the effect of NK fertilization on performance of yambean- pigeonpea intercropping system and its residual effect on succeeding mung. Legume Research **26**: 235-241.

Panda PK, Mishra IOP, Bal SS and Panigrahi RK. 2022. Evaluation of pigeonpea based intercropping systems under irrigated *rabi* condition in coastal odisha. Journal of Eco-friendly Agriculture **17**(1): 76-80.

Pradeep Kumar, Kumar M, Kumar A, Gharsiram Bhutekar S and Kumar S. 2022. Effect of conservation tillage and nutrient managementon maize in maize –pigeonpea intercropping system. The Pharma Innovation Journal **11**(2): 1005-1010.

Reddy APK, Selvam VS, Rao GNS and Ranjan MSS. 1993. Intercropping in late rainy season pigeonpea (*Cajanus cajan*). Under rainfed condition. Indian Journal of Agronomy **42**: 120-123.

Willey RW and Osiru DSO. 1972. Studies on mixtures of maize and beans (*Phaseolus vulgaris*) with particular reference to plant population. Journal of Agriculture Science Comb **79**: 517-529.

Willey RW. 1979. Intercropping- its importance and research needs. Part I: Competition and yield advantages. Field Crop Abstract **32**: 1-10.