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# Biological potential and land use efficiency of Pigeonpa based bio-intensive cropping system

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**Abstract**
To find out a pigeonpea based cropping system which is highly productive and biointensive and profitable the field experiment titled "Studies on profitable pigeonpea based relay intercropping system under paired row planting" was carried out during *Kharif* 2016 and 2017 at College of Agriculture, University of Agricultural and Horticultural Sciences (UAHS), Navile, Shivamogga. The soil of experimental field was red sandy loam in texture low in organic carbon (0.50%) and available nitrogen (232 kg $ha^{-1}$), high in available phosphorus (77.40 kg $ha^{-1}$) and medium in available potassium (193.50 kg $ha^{-1}$). The treatments included in the experiment were $T_1$: Pigeonpea in PR (paired row) of 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm), $T_2$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb field bean (45 x 15), $T_3$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable cowpea (45 x 20 cm), $T_4$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb French bean (45 x 15 cm), $T_5$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm), $T_6$: Sole field bean 95 x 15 cm), $T_7$: Sole vegetable cowpea (45 x 15 cm), T8: Sole French bean (45 x15 cm), $T_9$: Sole finger millet (30 x 10 cm), $T_{10}$: Sole pigeonpea (PR: 60-120-60 x 15 cm) and $T_{11}$: Sole baby corn (30 x 30 cm). The experiment was laid out in randomized block design with three replications. The performance of different relay intercropping systems was assessed in terms of PEY, system biological yield, monetary advantage index, land and space use efficiency indices. The highest pigeonpea equivalent yield (PEY) pooled over years was realized with cropping system pigeonpea (60-120-60 x 15 cm) +baby corn (30 x 30 cm) fb vegetable field bean (4327 kg $ha^{-1}$) closely followed by pigeonpea + baby corn fb finger millet (4238 kg $ha^{-1}$). Whereas, higher MAI (Rs. 89,959 $ha^{-1}$), LER (1.78) and ATER (1.32) were recorded with pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm).

**Keywords:** Relay intercropping, pigeonpea, baby corn, finger millet, vegetable cowpea pigeonpea equivalent yield

## Introduction
Pulse production in the country is not keeping pace with demand driven by population because of diminishing land holding sizes and competition for land from cereals, commercial crops and horticulture crops. Growing pulses as pure crop is also being reduced due their inherent low yield potentiality, more of pest and disease incidences and high market fluctuation. Among different pulse crops, pigeonpea can be considered as commercial pulse crop due to its yield potential, high consumption and better market. It is one of the major protein rich legumes grown throughout the tropical and subtropical regions of the world between $30^0$ North and $35^0$ South latitude. India is lying between $14^0$ North latitude and $28^0$N latitude, in which pigeonpea occupies an area about 3.96 m ha producing 2.56 m t with a productivity of 646 kg $ha^{-1}$ (Anon., 2017) [2]. However, due to its long duration (subjected to moisture stress), pod borer incidence and diseases like wilt and sterility mosaic virus are affecting the production stability and economic sustainability of the crop. Under the given scenario of scenario of shrinking in land resource, loss of soil carbon and soil erosion, it is need of the hour to produce more per unit area per unit time through growing more crops in a given period of time and space. This also helps for covering the soil for longer period.

Morphological features, long duration and elasticity nature of pigeonpea, there is a scope to accommodate more number of short duration crops/vegetables as addition either simultaneously (intercropping) or sequentially to increase number of products / crops / per unit area in same land in a year as against taking only one crop of maize under rainfed situation which is widely being followed at present in the region. The temporal and spatial variations could be useful to get maximum advantage. To achieve maximum yields from a minimum area bio-intensification with multiple cropping holds key as it also helps in sustaining the soil

fertility. The planting pattern also plays a key factor in exploiting the resources effectively.

he technique of paired row planting in crops like pigeonpea without reduction in plant population has been developed for effective and efficient utilization of resources by component crops there by harness maximum yield advantage from an intercropping system (Waghmore and Singh, 1982). When pigeonpea is grown as a sole crop, it is relatively inefficient because of its slow initial `growth rate and low harvest index (Willey and Rao, 1980) [7]. However initial slow growth rate and deep root system of pigeonpea offers good scope for intercropping with fast growing short duration crops. Therefore, short duration intercrops can be grown in between pigeonpea rows/paired row, for an efficient utilization of available resources for enhancing the productivity and profitability. Several short duration crops *viz*., baby corn, blackgram, soybean, groundnut, etc., could be grown as intercrops in pigeonpea. Importance of baby corn is little known to the Indian farmers in spite of the fact that it fetches very lucrative price in national and international markets. Baby corn cultivation is now picking up in some states of India (Ramachandrappa *et al*., 2004) [6]. The husked young ear in canned or fresh is more popular vegetable because of its sweetness, flavour, and crispness. It is a highly nutritious vegetable with protein (15-18%), sugar (0.016 - 0.020%), phosphorus (0.6 - 0.9%), potassium (2-3%), fibre (3-5%), calcium (0.3-0.5%), ascorbic acid (75-80 mg 100 $g^{-1}$) as its nutrient composition. Baby corn maize types are medium plant type and provide succulent delicious green ears within 65 to 75 days after sowing. After the harvest of the baby corn grown as intercrop in between two pairs of pigeonpea which receiving huge amount of nutrients remain in the soil as residual nutrients. Further, rainfall of the study region varies from 600- 950 mm spreading over April to November. The soils are red sandy loam to red clay loam. An early monsoon shower receiving during the months of April-May helps for land preparation. Early sowing in the month June (120.5 mm) will take up short duration crops as intercrop in pigeonpea which can be harvested by August. Normal rainfall of subsequent months is around 300 mm with 20 rainy days. With an object to exploit residual nutrients and moisture and utilize the possible post monsoon showers an investigation on pigeonpea based bio-intensive **c**ropping system through relay intercropping was taken up.

## Material and Methods

To find out a pigeonpea based cropping system which is highly productive and biointensive and profitable the field experiment titled "Studies on profitable pigeonpea based relay intercropping system under paired row planting" was carried out during *Kharif* 2016 and 2017 at College of Agriculture, University of Agricultural and Horticultural Sciences (UAHS), Navile, Shivamogga. The soil of experimental field was red sandy loam in texture low in organic carbon (0.50%) and available nitrogen (232 kg $ha^{-1}$), high in available phosphorus (77.40 kg $ha^{-1}$) and medium in available potassium (193.50 kg $ha^{-1}$). The treatments included in the experiment were $T_1$: Pigeonpea in PR (paired row) of 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm), $T_2$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb field bean (45 x 15), $T_3$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable cowpea (45 x 20 cm), $T_4$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb french bean (45 x 15 cm), $T_5$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm), $T_6$: Sole field bean 95 x 15 cm), $T_7$: Sole vegetable cowpea (45 x 15 cm), T8: Sole French bean (45 x15 cm), $T_9$: Sole finger millet (30 x 10 cm), $T_{10}$: Sole pigeonpea (PR: 60-120-60 x 15 cm) and $T_{11}$: Sole baby corn (30 x 30 cm). The experiment was laid out in randomized block design with three replications. Common dose farm yard manure @ rate 7.5 t $ha^{-1}$, was applied uniformly to all the treatments. Recommended dose respective fertilizers were applied separately on population basis to pigeonpea and baby corn. However, for subsequent relay intercrops after the harvest of baby corn in pigeonpea + baby corn intercropping treatments, fertilizer nutrients were not applied.

For valid conclusion, the observations *viz*., economic yield of baby corn, pigeonpea, relay intercrop yield, pigeon equivalent yield (PEY), system biological yield, land equivalent ratio (LER), monetary advantage index (MAI) have been worked out. The weight of dehusked babies from each net plot was recorded and same was converted into hectare and expressed in kg $ha^{-1}$. Similarly, net plot grain weight of pigeonpea was used estimate yield per $ha^{-1}$.

### Green fodder yield from baby corn

The green fodder harvested soon after completion of baby corn pickings from net plot area was weighed for which weight of husk separated from the babies also added to get total fodder obtained per plot by using the net weight, the green fodder per ha was calculated and expressed in kg $ha^{-1}$.

**Pigeon equivalent yield (PEY):** PEY was calculated using the formula given below and expressed in kg ha $^{-1}$.

$$PEY = Ypp + \frac{(Y_{bc} * P_{bc} + Y_{bgf} + P_{bgf} + Y_{rc} * P_{rc})}{P_{pp}}$$

**Where,**

$Y_{pp}$ = Grain yield of pigeonpea,
$Y_{bc}$= Yield of baby corn
$P_{bc}$ = Unit price of baby corn
$Y_{bgf}$ = Green fodder yield of baby corn
$P_{bgf}$= Unit price of green fodder
$Y_{rc}$ = Yield of relay inter crop
$P_{rc}$ = Unit price of relay intercrop

**System biological yield:** System biological yield was estimated as follows and expressed in kg $ha^{-1}$

System biological yield = Biological yield of baby corn + Biological yield of pigeonpea + Biological yield of relay intercrop

Biological yield of baby corn = Baby yield + (green fodder yield x 0.125)

Biological yield of pigeonpea = Grain yield + stalk yield

### Land use efficiency

To assess the land and time use efficiency, LER and ATER, respectively, were worked out using the formula given by Wlley (1979) [5].

$$LER = \frac{Y_{pb}}{Y_{pp}} + \frac{Y_{bp}}{Y_{bb}} + \frac{Y_{ra}}{Y_{rr}}$$

**Where,**

$Y_{pb}$ = Yield of pigeonpea under intercropping system
$Y_{pp}$ = Yield of pigeonpea under sole cropping
$Y_{bp}$ = Yield of baby corn under intercropping system
$Y_{bb}$ = Yield of baby corn under sole cropping
$Y_{ra}$ = Yield of relay intercrop under intercropping situation
$Y_{rr}$ = Yield of relay intercrops under pure stand

$$ATER = \frac{(Ry_p * t_p) + (Ryb * t_b) + Ry_r * t_r)}{T}$$

$$\text{Where, } Ry = \frac{\text{Yield of component crops under inter cropping situation}}{\text{Yield of the component crop under sole cropping}}$$

**Monetary advantage index (MAI):** Monetary advantage index was estimated as suggested by Gosh (2004) [3].

$$MAI = \frac{\text{Value of combined yield of both the component crops + Value relay intercrop x (LER-1)}}{LER}$$

## Results and Discussion

Higher pigeonpea yield was noticed in sole pigeonpea (2011 kg $ha^{-1}$) grown under paired row system of 60-120-60 cm x 15 cm closely followed by 1956 kg $ha^{-1}$ recorded with treatment pigeonpea (PR 60-120-60 cm x 15) + baby corn (30 x 30 cm). With respect to baby corn, highest yield was noticed in sole baby corn. This was almost two times higher than baby yield obtained under intercropping system. Among relay intercrops sole crops yields were three t eight times higher than their respective yield under intercropping situation (Table 1).

The highest pigeonpea equivalent yield (PEY) pooled over years was realized with cropping system pigeonpea (60-120-60 x 15 cm) +baby corn 930 x 30 cm) fb vegetable field bean (4327 kg $ha^{-1}$) closely followed by pigeonpea + baby corn fb finger millet (4238 kg $ha^{-1}$). The improvement in PEY was to an extent of 135 per cent and 123 percents in $T_2$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 15) and $T_5$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm) over sole pigeonpea, respectively (Table 2). However, all relay intercropping systems are on par with each other and significantly superior over either of the sole crops. Year wise data also indicated the statistical superiority of relay intercropping systems. Higher PEY in relay intercropping of in $T_2$ treatment is attributed to better and quick covering soil lead to soil moister conservation and improved microbial population there by caused for efficient utilization of resources by the cropping system. Kalthmale *et al*.(2014) have also reported same opinion on legumes as intercrop. Higher PEY in $T_5$treatments was due to yield and prevailing market price for finger millet. Further the variation in main crop equivalent yield was due to competitive ability of the crop (Rao and Willey, 1980) [7].

With regard to total system biological yield, peigeon + baby corn fb vegetable french bean registered highest biological yield of 17,738 kg ha $^{-1}$) pigeonpea + baby corn fb vegetable field bean (17036 kg ha $^{-1}$). This is due to better exploitation of growth resources *viz.*, soil moisture, nutrients and light. Effective light interception in these treatments led to better photosynthesis. It is evident from the observation taken on extent interception across intercropping systems studied (Table 2). Better the light reception better the biomass. Extent of light interception was 95 and 91.2% in $T_3$ and $T_2$, respectively, as against 65% in sole pigeon pea at 120 days old crops (full canopy development stage of pigeonpea). Better exploitation of residual nutrients due to application of respective RDF separately to both pigeonpea and baby corn by subsequent relay inter crop of field bean and french bean and finger millet might have attributed to higher biological yields. The results are in line with the findings of Singh and Srivastava (2018).

### Economics

The highest net return of Rs. 1, 19,676 was realized with pigeonpea (PR:60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) closely followed by Rs. 1,19,595 and Rs. 1,19,306, respectively, recorded in pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 15), pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable cowpea (45 x 20 cm). The increase in net returns in these treatments was to the tune of >95 per cent over, sole pigeonpea. This was attributed to better market price for the products, higher yield and cost cultivation (Table 4). Similarly, highest monerary advantage indx (MAI) of Rs. 89,959 $ha^{-1}$ was obtained with the treatment pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm) closely followed by Rs. 79,878 in pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 15). Extent of variation in monetary advantage among treatments and across years was mainly due to variation in yield and prevailing market prices (Table 4).

### Space and time use efficiency

Space use efficiency or land use efficiency is usually expressed in terms of LER (land equivalent ratio). The LER estimated revealed that the mean LER value recorded was higher with peigeonpea + baby corn –finger millet (1.78). The next in the order of merit is pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 20 cm) (1.60). This is attributed to higher yield of components crops under intercropping situation in relation to their under pure stand. Area time equivalent ratio (ATER) provides a more realistic comparison of yield advantage of intercropping over monocropping in terms of time taken by component in intercropping. (Adhikari, 2015). The mean of two years indicated that the higher ATER (1.32) was recorded with peigeonpea + baby corn –finger millet (1.32) closely followed by pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 20 cm) (1.22). Higher ATER in these treatments attributed to higher yield of component crops under intercropping situation in relation their yield under pure stand and less crop duration (Table 4).

**Table 1:** Grain yield of pigeonpea, baby yield and relay intercrop yields (kg ha$^{-1}$) under different pigeonpea based relay intercropping systems

| Treatments | Pigeonpea equivalent yield | | | Baby yield | | | Relay intercrop yield | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | Pooled | 2016 | 2017 | Pooled | 2016 | 2017 | Pooled |
| $T_1$: Pigeonpea in PR (paired row) of 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) | 2226 | 1685 | 1956 | 2120 | 1538 | 1829 | - | - | - |
| $T_2$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 15), | 2229 | 1605 | 1917 | 2270 | 1494 | 1882 | 455 | 413 | 434 |
| $T_3$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable cowpea (45 x 20 cm) | 2105 | 1697 | 1901 | 2232 | 1423 | 1827 | 526 | 467 | 497 |
| $T_4$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb French bean (45 x 15 cm) | 2080 | 1639 | 1860 | 2108 | 1506 | 1807 | 527 | 469 | 498 |
| $T_5$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm) | 2056 | 1636 | 1846 | 2220 | 1451 | 1836 | 525 | 395 | 460 |
| $T_6$: Sole field bean (95 x 15 cm), | - | - | - | - | - | - | 4980 | 4711 | 4845 |
| $T_7$: Sole vegetable cowpea (45 x 15 cm), | - | - | - | - | - | - | 4472 | 4619 | 4545 |
| T8: Sole French bean (45 x15 cm), | - | - | - | - | - | - | 6453 | 5457 | 5955 |
| $T_9$: Sole finger millet (30 x 10 cm), | - | - | - | - | - | - | 1415 | 1600 | 1507 |
| $T_{10}$: Sole pigeonpea (PR: 60-120-60 x 15 cm) | 2354 | 1687 | 2021 | - | - | - | - | - | - |
| $T_{11}$: Sole baby corn (30 x 30 cm) | - | - | - | 3741 | 2999 | 3370 | - | - | - |

RDF: Recommended dose of fertilizers DAS: Days after sowing
fb: followed by

**Table 2:** Pigeonpea equivalent yield (PEY) and total system biological yield (kg ha$^{-1}$) under different pigeonpea based relay intercropping systems

| Treatments | PEY | | | System biological yield | | |
|---|---|---|---|---|---|---|
| | 2016 | 2017 | Pooled | 2016 | 2017 | Pooled |
| $T_1$: Pigeonpea in PR (paired row) of 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) | 4181 | 3812 | 3997 | 17,881 | 14,013 | 15,947 |
| $T_2$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 15), | 4461 | 3873 | 4327 | 19,590 | 14,483 | 17,036 |
| $T_3$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable cowpea (45 x 20 cm) | 4291 | 3908 | 3852 | 19,470 | 15,242 | 17,356 |
| $T_4$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb French bean (45 x 15 cm) | 4177 | 4013 | 4045 | 19,453 | 16,024 | 17,738 |
| $T_5$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm | 4496 | 3896 | 4238 | 16,845 | 14,941 | 15,893 |
| $T_6$: Sole field bean (90 x 15 cm), | 1891 | 2120 | 2230 | 1997 | 1838 | 1918 |
| $T_7$: Sole vegetable cowpea (45 x 15 cm), | 1961 | 2079 | 2152 | 2601 | 2729 | 2665 |
| T8: Sole French bean (45 x15 cm), | 1096 | 2456 | 1708 | 3670 | 3246 | 3458 |
| $T_9$: Sole finger millet (30 x 10 cm), | 599 | 833 | 968 | 3183 | 4517 | 3850 |
| $T_{10}$: Sole pigeonpea (PR: 60-120-60 x 15 cm) | 2354 | 1687 | 1875 | 10,652 | 7637 | 9144 |
| $T_{11}$: Sole baby corn (30 x 30 cm) | 3729 | 4349 | 3577 | 18,872 | 14,612 | 16,742 |
| S.Em± | 283 | 265 | 268 | 511 | 839 | 499 |
| CD @5% | 835 | 784 | 791 | 1509 | 2477 | 1042 |

RDF: Recommended dose of fertilizers DAS: Days after sowing
fb: followed by

**Table 3:** Economics (Rs. ha$^{-1}$) as influenced by different pigeonpea based relay intercropping systems

| Treatments | Gross income | | | Cost of cultivation | | | Net returns | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | Pooled | 2016 | 2017 | Pooled | 2016 | 2017 | Pooled |
| $T_1$: Pigeonpea in PR (paired row) of 60-120-60 cm x15 cm) + baby corn (30 x 30 cm) | 246681 | 152491 | 199586 | 79500 | 80320 | 79910 | 167181 | 72171 | 119676 |
| $T_2$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable field bean (45 x 15), | 263211 | 154918 | 209065 | 88520 | 90420 | 89470 | 174691 | 64498 | 119595 |
| $T_3$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable cowpea (45 x 20 cm) | 253223 | 156319 | 204771 | 84830 | 86100 | 85465 | 168393 | 70219 | 119306 |
| $T_4$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb French bean (45 x 15 cm) | 246470 | 160522 | 203496 | 90540 | 90320 | 90430 | 155930 | 70202 | 113066 |
| $T_5$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm | 251909 | 155854 | 203882 | 86140 | 87120 | 86630 | 165769 | 68734 | 117252 |
| $T_6$: Sole field bean 95 x 15 cm), | 109453 | 84798 | 97126 | 41228 | 42300 | 41764 | 7843 | 20562 | 14202 |
| $T_7$: Sole vegetable cowpea (45 x 15 cm), | 89400 | 74142 | 81788 | 42032 | 43500 | 42766 | 20688 | 15697 | 18193 |
| T8: Sole French bean (45 x15 cm), | 28313 | 98238 | 63276 | 54970 | 58548 | 56759 | 26170 | 9522 | 17846 |
| $T_9$: Sole finger millet (30 x 10 cm), | 35359 | 33333 | 34346 | 34550 | 40150 | 37350 | 11929 | 7212 | 9571 |
| $T_{10}$: Sole pigeonpea (PR: 60-120-60 x 15 cm) | 138866 | 67493 | 103180 | 40950 | 44200 | 42575 | 97916 | 23293 | 60605 |
| $T_{11}$: Sole baby corn (30 x 30 cm) | 182000 | 173975 | 177988 | 72500 | 90315 | 81408 | 147505 | 83660 | 115583 |
| S.Em | 9921 | 10634 | 6859 | - | - | - | 8328 | 10398 | 6033 |
| CD at 5% | 2928 | 31372 | 2025 | - | - | - | 24569 | 30675 | 17798 |

RDF: Recommended dose of fertilizers DAS: Days after sowing
fb: followed by

**Table 4:** Land equivalent ratio (LER), monetary advantage index and area time equivalent ratio (ATER) of pigeonpea as influenced by planting geometry and nutrient management practices in pigeonpea + baby corn intercropping system

| Treatments | MAI (Rs. ha$^{-1}$) | | | LER | | | ATER | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | Mean | 2016 | 2017 | Mean | 2016 | 2017 | Mean |
| $T_1$: Pigeonpea in PR (paired row) of 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) | 84,288 | 51,639 | 67,964 | 1.52 | 1.51 | 1.52 | 1.20 | 1.20 | 1.20 |
| $T_2$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb field bean (45 x 15), | 1,03,782 | 55,973 | 79,878 | 1.65 | 1.50 | 1.60 | 1.25 | 1.19 | 1.22 |
| $T_3$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb vegetable cowpea (45 x 20 cm) | 94,860 | 57,346 | 76,104 | 1.60 | 1.50 | 1.59 | 1.20 | 1.24 | 1.22 |
| $T_4$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb French bean (45 x 15 cm) | 85,677 | 57,448 | 71,562 | 1.53 | 1.50 | 1.55 | 1.16 | 1.20 | 1.18 |
| $T_5$: Pigeonpea (PR: 60-120-60 cm x 15 cm) + baby corn (30 x 30 cm) fb finger millet (30 x 10 cm | 1,15,647 | 64,272 | 89,959 | 1.86 | 1.70 | 1.78 | 1.34 | 1.29 | 1.32 |

RDF: Recommended dose of fertilizers DAS: Days after sowing
fb: followed by

## Conclusion

From the study, it can be concluded that growing pigeonpea in paired row system with a crop geometry of 60-120-60 cm and introducing two/three rows of baby corn in between two pairs of pigeonpea and taking one more short duration crop in the form of legume vegetables like vegetable field bean/vegetable cowpea or drought tolerant crop like finger millet after the harvest of baby corn, it is possible not only to get higher monetary benefit but also residual moisture and nutrients applied to baby corn and nitrogen fixed by pigeonpea can be better exploited efficiently. In addition, higher land advantage, green fodder yield around 20 tones ha$^{-1}$ obtained can be used either as soilage or silage under intercropping system. This helps to maintain dairy throughout the year with quality fodder and pave the way for integrated farming system. Apart from this, legume vegetables when harvest for green pods will fetch higher market price. There by the farmer can get short term income to meet their day to day expenses during the part of the cropping season. Thus, fulfils not only food and nutritional security of the poor farmer but also economic security. Further, additional employment to an extent of 100-110 man days can be generated due to relay intercropping. Finally, overall soil fertility and productivity can be maintained thus, a step forward towards sustainable agriculture, the need of the hour.

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