*Int.J.Curr.Microbiol.App.Sci* (2018) *7*(2): 323-327

*International Journal of Current Microbiology and Applied Sciences*
***ISSN: 2319-7706* Volume 7 Number 02 (2018)**
Journal homepage: http://www.ijcmas.com

**Original Research Article** https://doi.org/10.20546/ijcmas.2018.702.042

# Studies on Intercropping in Rainfed Little Millet (*Panicum sumatrense*)

**K. Sharmili* and S. Manoharan**

*Department of Agronomy, Agricultural College and Research Institute, TamilNadu Agricultural University, Coimbatore-641003, Tamil Nadu, India*

**Corresponding author*

**Keywords**

Intercropping, Yield, Economics, LMGEY

**Article Info**

***Accepted:***
04 January 2018
***Available Online:***
10 February 2018

**A B S T R A C T**

A field experiment was conducted during *Rabi* season (2014) at Millet Breeding Station of TNAU, Coimbatore, TamilNadu to evaluate little millet based intercropping system under rainfed condition with five intercrops viz., radish, coriander, small onion, blackgram and greengram in 8:2 ratio under replacement series. Improvement in plant height, DMP, productive tillers plant$^{-1}$, grains panicle$^{-1}$, thousand grain weight and little millet grain equivalent yield (LMGEY) were recorded in intercropping over sole little millet. Among the intercropping system, LMGEY was highest in little millet + small onion (1832 kg ha$^{-1}$). However, lowest LMGEY was recorded in little millet + coriander (1373 kg ha$^{-1}$). Net return was found to be higher in little millet intercropped with small onion (35,612 Rs ha$^{-1}$) followed by little millet + greengram. Whereas B: C ratio was found to be higher in little millet intercropped with greengram (2.65) which was on par with little millet intercropped with blackgram (2.63). Intercropping index like relative crowding coefficient (RCC) was higher in little millet + blackgram (1.71), Aggressivity was higher in little millet + greengram (+0.10) and competition index (CI) was higher in little millet + small onion (1.00). Soil available N and P also increased under intercropping over solitary system.

## Introduction

Little millet (*Panicum sumatrense* L.) is a minor millet and is an important food crop for the poor people in the tribal areas of India, suitable for shallow gravels and poor alfislos. It is quick germinating, short duration crop tolerant to both drought and excess moisture. It becomes available for consumption at the time when there is an acute shortage of food grains in their households due to the crop is of short duration (80-90 days). It would be advantage, if extra yield could be harvested from the same unit of land in addition to sole component. Thus intercropping of some other crops with little millet may be sustainable cropping system under low management conditions. The information on growing of little millet in association with other crops is inadequate. Hence, an experiment was conducted to evaluate the comparative performance of little millet with different intercrops at 8:2 row ratio under rainfed conditions of Coimbatore.

## Materials and Methods

The field experiment was laid out in the Millet Breeding Station at Agricultural College and Research Institute, Coimbatore. The

experiment was laid out in randomized block design with four replications. The treatments consisted of sole crop of little millet, little millet + radish (8:2), little millet + coriander (8:2), little millet + small onion (8:2), little millet + blackgram (8:2) and little millet + greengram(8:2) intercropping under replacement series and all the intercrops *viz.*, radish, coriander, small onion, blackgram and greengram were raised separately adjacent to the treatment plots and the yields were recorded to work out indices related to biological efficiency of the intercropping system. After harvest of crop during December 2014, soil samples from surface layer (0-15 cm) were taken for chemical analysis. The intercropping assessment indices like relative crowding coefficient (Banik *et al.*, 2006), aggressivity (McGilchrist, 1965) and competition index (Wilson, 1988) were computed by using standard formulae. The intercropping system was also evaluated on the basis of different economical parameters *viz.*, gross returns (Rs $ha^{-1}$), net returns (Rs $ha^{-1}$) and B: C ratio.

## Results and Discussion

### Growth and yield attributes

The growth of finger millet was found to be affected by the intercrops. Even though the results were not significant, plant height of little millet was found to be higher at all the stages under the treatment, little millet + blackgram at 8:2 ratio (104.9 cm at harvest) followed by little millet + greengram at 8:2 ratio (104.7 cm at harvest) (Table 1). Among the various intercrops, sole crop of little millet and little millet intercropped with pulses produced higher dry matter production.

The yield attributes of little millet like number of panicles $tiller^{-1}$ and 1000 grain weight is found to be increased when intercropped with pulses (blackgram and greengram at 8:2 ratio, respectively) (Table 1) and it is on par with sole crop of little millet. Tripathi and Kushwaha (2013) reported that yield attributes of intercrop pearl millet *viz*., seeds $panicle^{-1}$ and 100 seed weight were substantially higher than that of sole pearl millet.

### Yield and system productivity

The grain yield of little millet was significantly influenced by various intercrops at harvest and the grain yield ranged from 1030 to 1484 kg $ha^{-1}$ (Table 2). Little millet sole crop registered the highest grain yield (1484 kg $ha^{-1}$). Little millet + blackgram at 8:2 ratio, little millet + small onion at 8:2 ratio, little millet + greengram at 8:2 ratio and little millet + coriander at 8:2 ratio were on par. Similar pattern was also observed by Basavarajappa *et al.,* (2003) in sole crop of foxtail millet, which was significantly higher than intercrop treatments. The different intercropping treatments did not significantly influenced the harvest index of little millet. The harvest index in different treatments ranged between 0.20 and 0.23.

Among different intercropping systems, little millet grown along with small onion and radish recorded higher grain equivalent yield (LMGEY) followed by intercropping little millet with pulses (Table 2). Ansari *et al.,* (2011) reported that pearl millet intercropped with pigeonpea recorded significantly higher pearl millet equivalent yield as compared to sole stand of component crops. It was due to almost similar yield of intercropped pearl millet as that of its sole stand and additional yield of pigeonpea as a bonus in intercropping system. Kumar *et al.,* (2008) reported that the higher little millet grain equivalent yield in 6:2 row ratio and horsegram sequence was due to higher yield of little millet and pigeonpea coupled with better utilization of the natural resources by the component crops in intercropping system.

**Table.1** Growth and yield attributes of little millet, RCC, Agressivity, CI as influenced by different intercropping systems

| Treatments | | Plant height (cm) | Dry matter production (kg ha$^{-1}$) | Total No. of tillers plant$^{-1}$ | 1000 grain weight (g) | Relative Crowing Coefficient (RCC) | Aggressivity | | Competition Index (CI) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Base crop | Intercrop | |
| $T_1$ | Little millet sole crop | 97.3 | 6925 | 8 | 2.40 | - | - | - | - |
| $T_2$ | Little millet + radish | 97.5 | 5638 | 7 | 2.37 | 0.60 | +0.01 | -0.01 | 0.98 |
| $T_3$ | Little millet + coriander | 97.5 | 5672 | 7 | 2.32 | 1.15 | +0.50 | -0.50 | 0.99 |
| $T_4$ | Little millet + small onion | 97.6 | 5846 | 7 | 2.39 | 1.65 | +0.01 | -0.01 | 1.00` |
| $T_5$ | Little millet + blackgram | 104.9 | 6800 | 8 | 2.43 | 1.71 | -0.07 | +0.07 | 0.99 |
| $T_6$ | Little millet + greengram | 104.7 | 6821 | 8 | 2.42 | 1.65 | -0.10 | +0.10 | 0.98 |
| | **Mean** | 99.9 | 6285 | 7.5 | 2.38 | Data not statistically analysed | | | |
| | **SEd** | 5.3 | 329 | 0.4 | 0.12 | | | | |
| | **CD (P=0.05)** | NS | 702* | 0.8* | NS | | | | |

*Significant at P 0.05; NS- Non Significant at P > 0.05

**Table.2** Yield, Net returns and B: C ratio of different little millet intercropping system

| Treatments | | Littlemillet yield (kg ha$^{-1}$) | | Yield of intercrops (kg ha$^{-1}$) | Littlemillet Grain equivalent yield (LMGEY) | Cost of cultivation (Rs ha$^{-1}$) | Net income (Rs ha$^{-1}$) | B:C ratio |
|---|---|---|---|---|---|---|---|---|
| | | Grain | Straw | | | | | |
| $T_1$ | Little millet sole crop | 1484 | 4952 | - | - | 51,453 | 21,345 | 30,108 |
| $T_2$ | Little millet + radish | 1030 | 4119 | 2847 | 1789 | 56,596 | 23,345 | 33,251 |
| $T_3$ | Little millet + coriander | 1220 | 4224 | 458 | 1373 | 47,094 | 21,545 | 25,549 |
| $T_4$ | Little millet + small onion | 1246 | 4496 | 1757 | 1832 | 60,957 | 25,345 | 35,612 |
| $T_5$ | Little millet + blackgram | 1295 | 4507 | 189 | 1673 | 56,500 | 21,505 | 34,995 |
| $T_6$ | Little millet + greengram | 1289 | 4590 | 199 | 1689 | 57,036 | 21,505 | 35,531 |

## Intercrop association

Little millet when grown with coriander at 8:2 ratio has recorded the highest aggressivity (+0.50) and the lowest little millet aggressivity of -0.07 was recorded when little millet was grown with blackgram gram at 8:2 ratio, Similar trend was also observed by Kalu Ram and Meena (2014) (Table 1).

The competition index of little millet + small onion at 8:2 ratio (1.00) is neither advantage nor disadvantage on the yield of intercropping system. Whereas, the other intercropping systems is advantages (Table 1).

Relative crowding coefficient value of all intercropping systems except radish is more than one indicating that all the systems are advantage and intercropping little millet with radish is disadvantageous. Pradhan *et al.*, (2014) also reported negative RCC value (-3.153) in finger millet + niger intercropping combination (Table 1).

## Economics of intercropping

The gross return, net return and benefit cost ratio was higher under little millet intercropped with blackgram, greengram and also small onion. Little millet with greengram at 8:2 ratio recorded higher gross return (Rs. 57,036 $ha^{-1}$), net return of (Rs. 35,531 $ha^{-1}$) and benefit cost ratio (2.65) and followed by little millet with blackgram at 8:2 ratio (Table 2) and this higher return was due to higher price of pulses.

According to Seran and Brintha (2009) the intercropping system provides higher cash return to smallholder farmers than growing the monocrops. Choudhary *et al.*, (2012) also reported that intercropping of pearl millet with greengram at 2:2 pair row ratio was distinctly superior over sole pearl millet and found most profitable by realizing the highest net return and LER and this is in support of the present study.

Based on the results of the above experiment, it could be concluded that intercropping of little millet with greengram at 8:2 ratio registered higher net return and B: C ratio followed by intercropping of little millet with blackgram and small onion compared to other intercrops. Intercropping of little millet with greengram recorded 15 per cent increase in net return over the sole crop of little millet.

Hence, little millet + greengram intercropping system can be recommended for rainfed condition for obtaining higher net return and B: C ratio. Little millet + blackgram and little millet + small onion intercropping system can be recommended as an alternative option.

## References

Ansari, M.A., Rana, K.S., Rana, D.S and Kumar, P. 2011. Effect of nutrient management and antitranspirant on rainfed sole and intercropped pearl millet (*Pennisetum glacum*) and pigeonpea (*Cajanus cajan*). *Indian J. Agron*., 56: 209-216.

Banik, P., Midya, A., Sarkar, B.K and Ghose, S.S. 2006. Wheat and chickpea intercropping systems in an additive series experiment: advantages and weed smothering. *European Journal of Agronomy*. 24: 325- 332.

Basavarajappa, R., Prabhakar, A.S. and Halikatti, S.I. 2003. Foxtail millet (*Setaria italica* L.) based inter cropping systems under shallow alfisols. *Karnataka J. Agric. Sci.*, 16: 514-518.

Choudhary, R., Dodia, I.N., Ramniwas Choudhary and Shankar Lal Golada. 2012. Effect of pear millet -based pulses intercropping in rained conditions. *Int. J. Forestry and crop improvement.* 3: 112-115.

Kalu Ram and Meena, R.S. 2014. Evaluation of pearl millet and mungbean intercropping systems in arid region of Rajasthan. *Bangladesh J. Bot*., 43: 367-370.

Kumar, K.B.H., Halikatti, S.I., Hiremath, S.M. and Chittapur, B.M. 2008. Effect of intercropping system and row proportions on the growth and yield of little millet and Pigeonpea. *Karnataka J. Agric. Sci.,* 21: 479-481.

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

Pradhan, A., Rajput, A.S. and Thakur, A. (2014). Yield and economic of finger millet (*Eleusine coracana* L. Gaertn) intercropping system. *Int. J. Curr. Microbiol. App. Sci.,* 3: 626-629.

Seran, T.H. and Brintha, I. 2009. Study on biological and economic efficiency of radish (*Raphanus sativus* L.) intercropped with vegetable amaranthus (*Amaranthus tricolor* L.). *Open Hortic. J.*, 2: 17-21.

Tripathi, A.K. and Kushwaha, H.S. 2013. Performance of pearl millet (*Pennisetum glaucum*) intercropped with pigeonpea (*Cajanus cajan*) under varying fertility levels in the rainfed environment of Bundelkhand region. *Ann. Agric. Res. New Series.* 34: 36-43.

Wilson, J.B. 1988. Shoot competition and root competition. *J. Applied Ecology*. 25: 279-296.

**How to cite this article:**

Sharmili, K. and Manoharan, S. 2018. Studies on Intercropping in Rainfed Little Millet (*Panicum sumatrense*). *Int.J.Curr.Microbiol.App.Sci.* 7(02): 323-327.
doi: https://doi.org/10.20546/ijcmas.2018.702.042