Agricultural Research & Technology
Open Access Journal
ISSN: 2471-6774

Juniper Publishers
key to the Researchers

Research Article
Volume 11 Issue 5 - September 2017
DOI: 10.19080/ARTOAJ.2017.11.555826

Agri Res & Tech: Open Access J

Effect of Crop Establishment Methods and Varieties on Tillering Habit, Growth Rate and Yield of Finger-Millet

LR Bhatta*, R Subedi, P Joshi and SB Gurung

Institute of Agriculture and Animal Science, Nepal

Submission: September 01, 2017; **Published:** September 26, 2017

***Corresponding author:** LR Bhatta, Institute of Agriculture and Animal Science, Lamjung Campus, Nepal, Email: lrbhatta55@gmail.com

Abstract

Finger-millet is self-pollinated, robust, tillering annual cereal crop grown as a rainy season crop in mid to high hills of Nepal. The average national productivity is only 1.1t/ha because it is still dominated as marginal crop and grown under poor management. Diverse planting methods across the country are evident. Therefore, a field experiment was conducted during rainy season of 2016 at Sundar bazar, Lamjung to evaluate effect of crop establishment methods and varieties tillering habit, growth rate and yield of finger-millet. The experiment was conducted in split-plot design replicated thrice. The main-plot factor comprised 4 varieties (Okhle-1, Dalle-1, KabreKodo-1 and KabreKodo-2) and the sub-plot factor was crop establishment methods (Direct Sowing (DS) @20×10cm, Conventional Transplanting method (CT) @ 10×10cm with 30 days old seedlings and System of Crop Intensification (SCI) @25×25cm with 15 days old seedlings). Growth was significantly affected by crop establishment method where SCI increased growth traits as plant height, tillering habit and growth rates over other planting methods resulting in 82.43% and 24.66% higher yield than DS and CT methods respectively. Similarly, yield of KabreKodo-2 was more than other varieties in this location. The results show KabreKodo-2 as a potential finger-millet variety in this agro-climate and SCI method can contribute better grain yield with a slight changes in the existing conventional practices.

Keywords: Conventional transplanting method; Crop establishment methods; Direct sowing method; System of crop intensification

Introduction

Finger-millet is small seeded grass, self -pollinated, robust, tufted and tillering annual cereal crop Michaelraj & Shanmugam [1]. Finger-millet withstand three challenges i.e. warming stress, water stress and nutrition stress so finger is called as Climate Change Compliant Crop (CCCC) Ferry [2]. Finger-millet is still dominated as marginal crop and grown under poor management. System of Crop Intensification (SCI) previously called as System of Rice Intensification (SRI) as this approach was practiced only in rice to increase the yield of rice Abraham et al. [3,4] by planting of the single young seedling at wider spacing.SCI approach facilitates the use of young seedling and wider spacing. The main theme of SCI is to producemore from less, using fewer seed and less water but manage the relationship between plant and soil so this is called as low input approach Abraham et al. [3,4]. Planting method varied among farmer according to their choice, leisure period and where they are cultivated (Eastern and Western hill region). The most practiced method is broadcasting and random transplanting. There is uneven distribution of plant which causes the competition among finger-millet for moisture and nutrient. Finger-millet when cultivated with SCI, the yield increase because there is less competition among plants and weed, plants can utilize below and above ground resources efficiently. Thus this experiment was conducted to study the effect of system of crop intensification in finger-millet.

Methodology

The research was conducted in agronomy farm of Institute of Agriculture and Animal Science in Sundarbazar, Lamjung Nepal during 29th June to 6th December, 2016. The experiment was laid out in split-plot design replicated thrice. The main-plot factors comprised four finger-millet varieties (Okhle-1, Dalle-1, Kabrekodo-1 and Kabrekodo-2) whereas the sub-plot factors was crop establishment methods viz. Direct Sowing (DS) (20cm×10cm), Conventional Transplanting (CT) (10cm×10cm with 30 days old seedling) and System of Crop Intensification (SRI) (25cm×25cm with 15 days old seedling). Before transplanting, chemical fertilizer was applied @ 50:30:20kg

NPK/ha. The half dose of nitrogen and full dose of phosphorous and potassium were applied on main plot of area 12 square meter and half dose of nitrogen was applied on at mid tailoring stage. All plot were hand weeded thrice: 15, 30 and 60 days after transplanting in SCI, 30, 45 and 60 days after transplanting in CT and 30, 45 and 60 days after sowing in DS. Harvesting was done manually. During harvesting, center one meter square area was measured and harvested separately and then left the head for sun drying and threshed manually and finally grain was cleaned by winnowing. Observation regarding growth traits including Tiller number, Crop growth rate and yield of grain were also recorded. Collected data were analyzed for ANOVA using SPSS version 20. The least significant difference (LSD) set at 5% probability level to compare means.

Results and Discussion

There is higher number of tiller per plant in SCI method than other method because tillering was furnished under wider spacing as compared to closer spacing it also attributed to the fact that transplanting of young seedling (15 days old) under wider spacing preferably square planting exerts less competitive pressure within plants in one hill and among plants in the field as a result tailoring was higher under wider spacing. Similar result where maximum number of tiller was observed in wider spacing has been reported by Nayak et al. [5] and Kewat et al. [6].

The significance difference among crop establishment method was also observed where higher crop growth rate was found in System of Crop Intensification (SCI) because of higher dry matter accumulation is more in wider spacing , wider spacing influenced profuse growth. Similar observation was found in Nayak et al. [5].

Finger-millet varieties show non-significant effect on grain yield but there is highly significant effect of crop establishment methods and found to be more under System of Crop Intensification (SCI) methods and which was statistically at par with conventional transplanting (CT).Similarly, higher yield was found in system of crop intensification method in finger-millet Abraham, et al. [2,3]. The highest grain yield of rice was obtained under 25 cm × 25 cm spacing Dahal & Khadka [7] so similar result can happen in other tillering cereal crop [8-10].

Treatment means are separated by Duncan's Multiple Range Test (DMRT) and the columns represented by same letter (s) are not significantly different among each other at 5% level of significance.

*Significant, ** highly significant, NS –Non significant

Conclusion

Growth characters were more under system of crop intensification methods due to higher spacing results in higher crop growth rate because of more availability and utilization of under and aboveground resources, which leads higher tiller number per plant also increased which results in 82.43% more yield in system of crop intensification than direct sowing and 24.66% more yield than conventional transplanting. It was concluded that system of crop intensification method not only increase the yield, it possess double advantage viz. lower seed and seedling requirement and higher productivity. So it is better to transplant younger seedling (15 days old or at biological stage i.e. 2-3 leaf stage) at wider spacing (25×25) cm or generally at square planting. The yield of KabreKodo-2 was relatively more than other varieties and the result showed that KabreKodo-2 as potential varieties in this agro-climate.

References

1. Michaelraj PSJ, Shahmugam A (2013) A study on millets based cultivation and consumption in India. International Journal of Marketing. Financial Services and Management Research 2(4): 49-50.
2. Ferry LS (2014) Indigenous crop: Finger-millet - high five for nutrition.
3. Abraham B, Araya H, Berhe T, Edwards S, Gujja B, et al. (2014) The system of crop intensification: Report from the field on improving agricultural production, food security and resilience to climate change for multiple crops.
4. Abraham B, Adeoluwa OO, Araya H, Berhe T, Bhatta Y, et al. (2014) The System of Crop Intensification: Agro-ecological innovation for improving agricultural production, food security and resilience to climate change.
5. Nayak BC, Dalei BB, Choudhury BK (2003) Response of hybrid rice (Oryzasativa) to date of planting, spacing and seedling rate during wet season. Indian Journal of Agronomy 48(3): 172-174.
6. Kewat ML, Agrawal SB, Agrawal KK, Sharma RS (2002) Effect of divergent plant spacing and age of seedlings on yield and economics of hybrid rice (Oryza sativa). Indian Journal of Agronomy 47(3): 367-371.
7. Dahal RK, Khadka BR (2012) Performance of rice with varied age of seedlings and planting geometry under system of rice intensification (SRI) in farmer field in western Terai, Nepal. Nepal Journal of Science and Technology 13(2): 1-6.
8. Bitew Y, Asargew F (2014) Determination of seed rate and inter row spacing for finger-millet production (Eleusinecoracana) in North Western Ethiopia. International Journal of Research and Review.
9. NARC (2014) Released and registered crop varieties in Nepal.
10. Thakur AK, Mananty RK, Singh R, Patil DU (2015) Enhancing water and cropping productivity through Integrated System of Rice Intensification (ISRI) with aquaculture and horticulture under raised condition.

How to cite this article: L R Bhatta, R Subedi, P Joshi, S B Gurung. Effect of Crop Establishment Methods and Varieties on Tillering Habit, Growth Rate and Yield of Finger-Millet. Agri Res & Tech: Open Access J. 2017; 11(5): 555826. DOI: 10.19080/ARTOAJ.2017.11.555826.

DOI: 10.19080/ARTOAJ.2017.11.555826

How to cite this article: L R Bhatta, R Subedi, P Joshi, S B Gurung. Effect of Crop Establishment Methods and Varieties on Tillering Habit, Growth Rate and Yield of Finger-Millet. Agri Res & Tech: Open Access J. 2017; 11(5): 555826. DOI: 10.19080/ARTOAJ.2017.11.555826.