DOI: 10.15740/HAS/AU/12.TECHSEAR(1)2017/23-27
Agriculture Update
Volume **12** | TECHSEAR-1 | 2017 | 23-27
Visit us : *www.researchjournal.co.in*
e ISSN-0976-6847

RESEARCH ARTICLE :

Free ranging desi poultry as a component in sugarcane integrated farming system and its effect on growth and productivity of sugarcane

T. ANANTHI AND M. MOHAMED AMANULLAH

ARTICLE CHRONICLE :
Received :
05.07.2017;
Accepted :
22.07.2017

SUMMARY : A field experiment was conducted in farmers field at Coimbatore during *Kharif*, 2016 -17 to study the effect of introducing free ranging desi poultry in maize integrated farming system and its on growth and yield of maize. The popular variety Mandya was used as test variety. Two farming systems *viz.,* Sugarcane alone; Sugarcane + desi poultry (2 hens and 1 rooster for 3 cents) were evaluated under field conditions. The sugarcane + desi poultry recorded better growth parameters, yield attributes and yield than under sole sugarcane. Sugarcane along with desi poultry lowered the weed density and dry weight during critical stage of the crop growth. The increase in yield under sugarcane + desi poultry was negligible when compared to cane yield of sugarcane. The yield attributes *viz.,* cane length (cm), cane girth (cm), number of millable canes, number of inter nodes, individual cane weight and cane yield were slightly higher under sugarcane + desi poultry farming systems. The treatment combination of sugarcane with desi poultry recorded higher available soil nutrients (NPK) than sole sugarcane.

KEY WORDS :
Sugarcane, Desi poultry, Weed density, Growth, Yield

How to cite this article : Ananthi, T. and Amanullah, M. Mohamed (2017). Free ranging desi poultry as a component in sugarcane integrated farming system and its effect on growth and productivity of sugarcane. *Agric. Update*, **12**(TECHSEAR-1) **: 23-27; DOI: 10.15740/HAS/AU/12.TECHSEAR(1)2017/23-27.**

Author for correspondence :
M. MOHAMED AMANULLAH
Department of Agronomy, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA
Email:ananthu12@gmail.com

See end of the article for authors' affiliations

BACKGROUND AND OBJECTIVES

Sugarcane is the most adaptable plant under varied ecological conditions. In tropical agriculture, water, nutrients and weeds are the major threat in crop production which affects the crop yields considerably. The average productivity of sugarcane in tropics is around 80 t h^{-1} while in the subtropics; it is around 50 t h^{-1} (Nair, 2011).

Many sugarcane workers have reported that there is a wide yield gap between the actually harvested and estimated potential and the gap is estimated to be around 20.3 per cent (Singh *et al.*, 2009).

The total area of sugarcane is about 19 million hectare and the production is about 12 million tons of sugar. Today India maintains the second position, next to Brazil. The availability of land for agriculture is shrinking as it is increasingly utilized for non-agricultural purposes. Under this situation, one of the important strategies to increase agricultural output is the development of new high intensity cropping systems including intercropping

systems. The main purpose of intercropping is to produce more yield on a given piece of land by making effective use of resources that would otherwise not be utilized by a single crop efficiently.

Small holder poultry production (*i.e.* family poultry) is an appropriate system that makes the best use of locally available resources. Family flocks are important providers of eggs and meat as well as being valued in religious and cultural life. Poultry is one of the fastest growing segments of the agricultural sector in and around Coimbatore district of Tamil Nadu. There are three production systems for family poultry - free range, backyard and small-scale intensive with productivity of 40 - 60, 50 - 100 and 80 - 150 eggs / hen / year, respectively. Under free ranging system, desi poultry hens start egg laying from six month onwards. Poultry, particularly in the free range, provide meat, eggs, feathers, manure (convertible to fertilizer and natural gas), pest control, weed clearance, seed cleaning of grasses for mulch, scratching and foraging (Sonaiya *et al*., 2013).

By proper selection programme, egg production of desi hen could be increased upto 135 eggs per year. Productivity of indigenous chicken breeds may be doubled with improved diets and management conditions. The indigenous chickens have not attained their full production potential due to exposure to risks that influence against their survival and productivity under extensive management conditions. However, the research works under field level on age at sexual maturity, average weight at first egg, average live weight at 28th week and hen day egg production at 52 weeks of age have been noticed.

Under free-range systems, desi poultry can easily pick up its food in the backyards once it learns to scavenge in the household surrounding. Under free-range conditions the necessity of supplementary feed/ feed ingredients mostly depends on the free area available in the field, intensity of vegetation and availability of waste grains, insects, grass seeds etc. (Pathak and Nath, 2013).

In western and north western zone of Tamil Nadu, desi poultry are generally kept to supplement the family income and protein diet. These birds which are normally the indigenous stock, are raised on the free-range system scavenging for food comprising mainly of fallen grains, worms, insects, table and kitchen scraps as well as local weeds and grasses.

In the western zone of Tamil Nadu, particularly Namakkal, Salem and Coimbatore districts, free ranging desi birds are introduced in sorghum, maize and sugarcane fields during the maximum tillering to get rid of some weeds and insects (Quisumbing, 1983) and there has been no reported damage to crops.

There are many positive factors associated with desi poultry being integrated into cropping enterprises: (i) crops produced on the farm can be used to feed the desi poulrty, thus minimizing the importing of outside feed stuffs in desi poultry production; (ii) poultry manure can serve as the primary source of nutrients for crop production, thereby cycling of nutrients from the crops through the birds and back out onto the land.

Current agricultural systems utilizing monocultures and short rotations require more external inputs (Karlen *et al*., 1994), and the question has been raised whether the substitution of capital, energy, and synthetic chemicals for diverse crop rotations can sustain stable and productive agricultural systems (Bullock, 1992; Brummer, 1998 and Randall, 2003). As described above, evidence is accumulating that over-reliance on simple crop rotations may have long-term implications that threaten economic and biological sustainability of agriculture in rural India.

Diversification of farming operations could be a viable approach to alleviate many of the problems being documented in our current agricultural production systems (Brummer, 1998). One method for diversifying agricultural systems is through integration of crops and free ranging desi poultry within the same cropping system. Therefore, the purpose of this study was to compare and evaluate the growth and productivity of sugarcane under free ranging desi poultry + Sugarcane cropping system.

RESOURCES AND METHODS

Experiment was conducted in farmer's field at Perur and Panaimarathur village, Coimbatore during *Kharif*, 2016 -17. Initial soil samples were collected at random prior to the field experiment, pooled and analysed for chemical characteristics. The soil of the experimental field was clay loam in texture belonging to *Typic haplustalf*. The nutrient status of the initial soil was low in available nitrogen (77 kg ha^{-1}), medium in available phosphorus (20 kg ha^{-1}) and high in available potassium (607 kg ha^{-1}). The soil pH was 8.33 and soil EC 0.68

dSm^{-1}. The experiment was laid out as non replicated trial in two locations. Two farming systems *viz.*, Sugarcane alone; Sugarcane + desi poultry (2 hens and 1 rooster for 3 cents) were evaluated under field conditions. The area allocated for the experimental trial was six cents (242.8 m^2). In this area, three cents (121.40 m^2) was demarked and fenced using shade net. The desi poultry chicks were introduced at 20 days after planting of sugarcane.

Sugarcane variety Mandya was chosen for study. The desi poultry chicks were introduced at 60 days after planting of sugarcane. Sugarcane variety Mandya was chosen for study. A seed rate of 75,000 two budded setts were used. The setts were planted along the centre of the furrows, accommodating 12 buds / metre length. Well decomposed farm yard manure at the rate of 12.5 t ha^{-1} was applied uniformly over the field before last ploughing. The recommended fertilizer dose followed for sugarcane was 300:100:200 kg NPK ha^{-1}.

Ten plants in each treatment in the net plot were selected at random as sample plants and tagged for taking observations *viz*., plant height, leaf area index and dry matter production (DMP). Observations on weed parameters *viz*., weed density and weed dry weight were recorded. Weed count was recorded by placing four quadrats of size 0.5 m x 0.5 m in each plot and the weeds falling within the frames of the quadrat were counted, recorded and the mean values expressed in number m^{-2}.

Yield components such as cane length (cm), cane girth (cm), number of millable canes, number of inter nodes, individual cane weight and cane yield were recorded. The post-harvest soil samples were collected after the harvest of crop from the individual plots. The samples were shade dried, powdered, sieved through 2 mm sieve and then analyzed for available nutrient content.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Growth and yield attributes:

Plant height which represents the time trend of growth was recorded at different phenophases of sugarcane. Numerical difference in plant height was observed with maize and sugarcane + desi poultry integrated system during the crop period. Growth parameters *viz.*, plant height, leaf area index and dry matter production gradually increased upto 120 days after planting (Table 1). Taller plants and higher dry matter production were recorded in sugarcane along with desi poultry introduced field when compared to sole sugarcane crop. Increase in plant height and dry matter production under sugarcane + desi poultry treatment was due to the fact that the optimum nutrients available in sugarcane + desi poultry integrated field due to poultry droppings which probably provided favourable physical environment and helped the plants to grow taller.

Weed density and weed dry weight:

Major weed flora found in the experimental field were broad leaved weeds (*Trianthema portulacastrum, Amaranthus viridis* and *Digeria arvensis*) followed by grasses (*Dactyloctenium aegyptium, Echinochloa colonum)* and sedges (*Cyperus rotundus*).

Weed density (m^2) and weed dry weight (kg ha^{-1}) was recorded at 60 and 90 DAP in sugarcane crop. In this experiment, higher weed density was observed at 60 DAP. Sugarcane crop with desi poultry recorded lower weed density (1.15 No m^{-2}) at 90 DAP (Table 2). This might be due to the fact that the emerging weeds were destroyed by poultry birds. This behaviour of desi

Table 1 : Growth parameters of sugarcane as influenced by desi poultry

Farming system	Plant height (cm)			Leaf area index			Dry matter production (t ha^{-1})		
	60 DAP	90 DAP	120 DAP	60 DAP	90 DAP	120 DAP	60 DAP	90 DAP	120 DAP
Sugarcane alone	135.4	168.4	207.6	1.52	2.16	2.32	1.18	2.03	6.17
Sugarcane+desi bird	136.8	172.6	208.4	1.54	2.19	2.44	1.45	2.17	6.25

Table 2 : Yield parameters of sugarcane as influenced by desi poultry

Farming system	Millable cane (000 ha^{-1})	Cane length (cm)	Cane girth (cm)	Number of internode	Internode length (cm)	Cane yield (t ha^{-1})
Sugarcane alone	146.6	153.2	7.53	16.41	14.48	92.03
Sugarcane+desi bird	148.3	155.4	7.82	16.56	14.53	95.42

Table 3 : Weed parameters and post harvest available nutrients (kg ha^{-1}) of sugarcane influenced by desi poultry

Farming system	Total weed density (No. m^{-2})	Total weed dry weight (g m^{-2})	Organic carbon (%)	Nitrogen	Phosphorus	Potassium
	60 DAP	90 DAP				
Sugarcane	10.36	4.54	0.58	70.64	17.52	596.3
Sugarcane+ desi poultry	10.51	1.15	0.62	76.53	18.84	602.4

birds in favourable soil environment might have resulted in reduced crop weed competition for the growth factors such as light, space and nutrients which in turn helped in efficient photosynthetic activity recording taller plants. The plots having higher weed control efficiency got more resources and produced taller plants as earlier reported by Nadeem *et al*. (2010).

Yield attributes and yield:

Among the sugarcane farming systems higher cane length (cm), cane girth (cm), number of millable canes, number of inter nodes, individual cane weight and cane yield were recorded under sugarcane + desi poultry introduced field during the cropping period (Table 2).

Sugarcane + desi poultry introduced field recorded higher cane yield (95.43 t ha^{-1}) during *Kharif*, 2016 -17 (Table 1). The yield increase could be attributed to the reason that desi poultry birds might have damaged the emerged weeds avoiding competition for crop growth from initial stages and lasting to later growth stages. The poultry litter addition in maize + desi poultry cropping system provided the nutrients which in turn to the crop could have increased the yield. Similar findings reported by Dwivedi *et al*. (2012) are in support of the present result.

Post harvest available nutrients in soil:

The sugarcane grown field registered lower soil organic matter and available NPK during both the seasons (Table 3). The reduction in soil available nutrients compared to initial status, particularly N and K in sugarcane crop might be due to higher uptake than the quantity of nutrients applied.

The benefits of desi poultry in farming system is maintaining the soil organic matter levels and post harvest available nutrients were well established. This might be due to the influence of sources of nutrients on the addition of poultry manure and other organic residues left after the harvest of each crop. Since, the maize root carbon to soil organic carbon per cent was 1.5 times higher (Balubane, 1996). The present study has suggested that introduction of desi poultry in sugarcane systems improved soil quality and soil organic carbon content.

Acknowledgement:

Author is thankful to Dr. M. Mohamed Amanullah, Professor , Department of Agronomy Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, INDIA for his kind guidance, motivation and unconditional support for this work.

Authors' affiliations :

T. ANANTHI, Department of Agronomy, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA

REFERENCES

Balubane, M. (1996). Turnover of clat-associated organic nitrogen in the different aggregate size classes of cultivated silty loam. *Eur. J. Soil Sci.,* **47**: 285-291.

Brummer, E.C. (1998). Diversity, stability, and sustainable American agriculture. *Agron. J.,* **90** : 1–2.

Bullock, D.G. (1992). Crop rotation. *Crit. Rev. Plant Sci.,* **11** : 309–326.

Dwivedi, S.K., Shrivastava, G.K., Singh, A.P. and Lakpale, R. (2012). Weeds and crop productivity of maize + blackgram intercropping system in Chhattisgarh plains. *Indian J. Weed Sci.,* **44** (1): 26–29.

Karlen, D.L., Varvel, G.E., Bullock, D.G. and Cruse, R.M. (1994). Crop rotations for the 21st century. *Adv. Agron.*, **53** : 1–45.

Nadeem, M.A., Awais, M., Ayub, M., Tahir, M. and Maqbool, M.M. (2010). Integrated weed management studies for autumn planted maize. *Pakistan J. Life & Soc. Sci.*, **8** (2) : 98-101.

Nair, N.V. (2011). The challenges and opportunities in sugarcane agriculture. Proceedings of the 9th Joint Convention of the Sugar Technologies Association of India and South Indian Sugar and Sugarcane Technologists, August 19-21, 2010, Chennai Trade Centre Complex, Chennai, India.

Pathak, P.K. and Nath, B.G. (2013). Rural poultry farming with improved breed of backyard chicken. *J. World's Poult. Res.*, **3**(1): 24-27.

Quisumbing, E.C. (1983). Farming systems program in the Philippines. In: Crop-Livestock Integration Farming Systems on 25-28 April 1983 at the International Rice Research Institute (IRRI), Los Banos, Laguna, Philippines, 14 pp.

Randall, G.W. (2003). Present-day agriculture in southern Minnesota— is it sustainable? Available at http:// sroc.coafes.umn.edu/Soils/ Recent%20Publications% 20and%20Abstracts/Present-Day% 20Agriculture.pdf (accessed Mar. 2005, 20 Jan. 2006; verified 21 Nov. 2006). Univ. of Minnesota, Southern Res. and Outreach Center, Waseca.

Singh, P., Agarwal, P.K., Bhatia, V.S., Murthy, M.V.R and Pala, M. (2009). Yield Gap Analysis: Modelling of Achieveable Yields at Farm Level. In: *Rainfed Agriculture: Unlocking the potential*, Wani, S.P., J. Rockstrom and T. Oweis (Eds.). CAB International Publishing. Wallingford Oxfordshire, UK., ISBN-13: 9781845934385, pp:81-123.

Sonaiya, E.B., Branckaert, R.D.S. and Gueye. E.F. (2013). Research and Development Options for Family Poultry, FAO, 2013. Animal production and health. The scope and effect of family poultry research and development, International Network for Family Poultry Development (INFPD).