International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(2): 1522-1524

Received: 22-01-2020
Accepted: 24-02-2020

R Raja Priya
Teaching Assistant (Agronomy), Cotton Research Station, Veppanthattai, Perambalur, Tamil Nadu, India

NK Prabhakaran
Professor and Head, Agricultural Research Station, Bhavani Sagar, Erode, Tamil Nadu, India

Corresponding Author:
R Raja Priya
Teaching Assistant (Agronomy), Cotton Research Station, Veppanthattai, Perambalur, Tamil Nadu, India

Influence of weed management practices on nutrient status of maize and weed

R Raja Priya and NK Prabhakaran

DOI: https://doi.org/10.22271/chemi.2020.v8.i2w.8977

Abstract
Field research was carried out at Research Farm, Department of Agronomy, AC & RI, Coimbatore during *kharif* season of 2016 to study the different weed management practices on nutrient content of maize and weed. The experiment was laid out in randomized plot design and replicated thrice. The treatments consists of eight various weed management practices *viz.*, stale seed bed followed by one hand weeding on 30 DAS, stale seed bed followed by twin wheel hoe weeder weeding on 30 DAS, mulching with crop residue @ 5 t ha^{-1} applied at sowing, intercropping with sunnhemp and incorporation on 40 DAS, intercropping with fodder cowpea, twin wheel hoe weeder weeding on 15 and 30 DAS, hand weeding on 15 and 30 DAS and unweeded control. The result of this field trail showed that removal of primary nutrients by weeds were higher in intercropping with fodder cowpea and lower was recorded under mulching with crop residue @ 5 t/ha applied at sowing. In order to crop nutrient uptake pattern, higher nutrient content was noticed in mulching with crop residue @ 5 t ha^{-1} applied at sowing and lower in intercropping with sunnhemp and incorporation on 40 DAS.

Keywords: Nutrient, mulching, weeds, uptake, removal

Introduction
Maize is one of the most important cereal crops next to rice and wheat. For its high yielding capacity among the cereal crops, it is known as "Queen of cereals". Maize grain contains about 72% starch, 10% protein, 4.8% oil, 9.5% fibre, 3% sugar, and 1.7% ash (Muhammad *et al*., 2010) [1]. Among the different biotic factors which have a significant influence on the performance of maize crop, weeds are the most important one. Weeds are unwanted plants playing a very significant role in different agro-eco-system and many of them cause direct and indirect losses. Weed cause huge reduction in crop yield but also increase cost of cultivation and reduce input use. Weed management takes away nearly one third of total cost of production of field crops. Weeds are one of the obstacles that affect the crop productivity and quality of yield. Weed control in all agricultural crops is necessary to get a good yield and profit. The yield losses due to weeds vary depending on the weed species, their density and environmental factors. Yield losses in maize crop due to weeds are estimated upto 35% (Hassan & Ahmed, 2005) [2].

Understanding the ecological relationship in crop – weed competition, it is significantly important to develop an effective crop management technology and to prevent the huge loss due to weeds. Herbicidal weed management has become a key component in almost all weed management strategies. At the same time, the continuous use of the same group of herbicides over a period of time on a same piece of land leads to ecological imbalance in terms of weed shift, herbicide resistance in weeds and environmental pollutions **(**Gnanavel and Natarajan, 2014; Sharma, 2014 and Kumar, 2014) [3-5]. Organic way of cultivation is suitable to overcome these problems and to reduce the residual effect of agrochemicals. Keeping this in mind, the present study was formulated to know the effect of different weed management practices on nutrient content of weed and maize.

Materials and Methods
A Field study was conducted during *kharif* season of 2016 at Research Farm, Department of Agronomy, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu. The experimental site was geographically located in the Western

Agro Climatic Zone of Tamil Nadu at 11°N latitude, 77 °E longitude and altitude was 426.7 m above mean sea level. The texture of soil in the experimental site was sandy clay loam with pH of 7.30. With regard to nutrient content, the soil was low in available nitrogen (191.60 kg ha^{-1}), medium in phosphorus (11.20 kg ha^{-1}) and high in potassium (449.80 kg ha^{-1}), respectively. Maize hybrid COH (M) 6 with the duration of 110 days was used as a test crop.

The experiment was laid out in randomized block design with three replications. The treatments comprised of eight weed management practices *viz*., stale seed bed (flushing out of germinable weed seeds prior to the planting of the maize crop) followed by one hand weeding or twin wheel hoe weeder weeding on 30 DAS, mulching with crop residue @ 5 t ha^{-1} applied at sowing (previous crop residue was cut into two to three pieces and applied next day of sowing in the entire plot as a dense covering except where the seeds are placed), intercropping with sunnhemp and incorporation on 40 DAS (Sunnhemp was sown along with main crop as solid row planting), intercropping with fodder cowpea, which was sown along with main crop and harvested at 50 per cent of flowering, twin wheel hoe weeder weeding or hand weeding given twice on 15 and 30 DAS and unweeded control. In order to study the different weed management practices on nutrient content of maize and weed, the plant and weed samples were collected which was kept in shade for drying then oven dried and grind in a willey mill and used for analysis of nutrient contents. The nitrogen, phosphorus and potassium uptake by crops and removal by weeds were analysed and expressed in kg ha^{-1}. Nitrogen was analysed by Kjeldahl method (Humphries, 1956) [6], P by Triple acid digestion with colorimetric estimation method (Jackson, 1973) [7] and K by Triple acid digestion with flame photometric method (Jackson, 1973) [8] at 15, 30, 45 DAS and at harvest. The data was collected and analyzed statistically based on the standard procedure given by Gomez and Gomez (1984) [9] to find out the treatment differences.

Result and Discussion

Nutrients uptake by plants

Data on nutrient uptake by maize shows that clear variation among different weed management practices (Table 1). Mulching with crop residue @ 5 t ha^{-1} applied at sowing recorded conspicuously higher nutrient uptake (122.51, 16.33 and 40.84 kg NPK per ha respectively) and it was followed by stale seed bed with hand weeding on 30 DAS. Distinctly lower K uptake was registered in intercropping with sunnhemp and incorporation on 40 DAS (77.60, 10.35 and 25.87 kg NPK per ha respectively) barring unweeded control.

The weed management treatments reduced the weed density and weed dry weight as compared to unweeded check resulting in more nutrients available to the crop for better growth and production. Mulched plot shows higher uptake of nutrients by maize which might be due to reduced competition by weeds and thus better crop growth and increased dry matter production. Deepa and Jayakumar (2008) [10] concluded that nitrogen removal by weeds increased and reduced the crop uptake as weed density increased and resulted in decreased yield. Unweeded control produced less plant dry matter in turn recording lower nutrient uptake by maize due to maximum utilization of resources by weeds rather than crops, as a result of high degree of weed competition. Fertilizer use efficiency can be increased by adopting suitable weed management practices (Shiv Mangal Prasad *et al*., 2001) [11].

Nutrients removal by weeds

Data on nutrient removal by weeds was given in Table 2. At harvest, mulching with crop residue @ 5 t ha^{-1} applied at sowing removed lesser amount of nutrients *viz*., nitrogen, phosphorus, potassium (0.41, 0.05, 0.14 kg per ha respectively) and it was followed by stale seed bed with one hand weeding on 30 DAS. Significantly higher removal of nutrients by weeds was observes in intercropping with fodder cowpea treatment.

The effective control of weeds by mulching with crop residue @ 5 t ha^{-1} applied at sowing reduce the weed density and dry weight considerably which led to the lower removal of N, P and K by weeds. The nutrient removal pattern by weeds showed that wherever the weed control was effective the nutrient loss due to weeds was also less. Among the weed management treatments imposed, intercropping with fodder cowpea registered higher nutrient removal by weeds due to poor control of weeds especially broad leaved weeds which is predominant in the experimental field. The loss of nutrient by weeds in different treatments varied with the intensity of weeds and weed biomass accumulation. Weeds in unweeded control have taken up twice the amount of nitrogen as compared to weed control treatments (Payman and Singh, 2008) [12].

Post harvest nutrient status of soil

The maximum soil available nitrogen (Fig. 1) and potassium was determined in mulching with crop residue @ 5 t ha^{-1} applied at sowing which was followed by stale seed bed with one hand weeding. Unweeded control resulted in distinctly lower available N and potassium because it recorded higher weed density leads to removal of more amounts of nutrients from the soil at all the growth stages of the crop. Higher soil available phosphorus was estimated in mulching with crop residue @ 5 t ha^{-1} applied at sowing because, weeds removed lesser nutrients for its growth and the lower quantum of soil available phosphorus was estimated in unweeded control. In mulching treatment, it facilitates more retention of soil moisture and helps in control of temperature fluctuations, improves properties of soil *viz*., physical, chemical and biological, as it adds nutrients to the soil and ultimately enhances the growth and yield of crops (Kumar *et al*., 1990) [13].

Table 1: Nutrients uptake of maize at harvest (kg ha^{-1})

	Treatment	N	P	K
T_1	Stale seed bed *fb* one hand weeding on 30 DAS	113.60	15.15	37.87
T_2	Stale seed bed *fb* twin wheel hoe weeder weeding on 30 DAS	104.73	13.96	34.91
T_3	Mulching with crop residues @ 5 t ha^{-1} applied at sowing	122.51	16.33	40.84
T_4	Intercropping with sunnhemp and incorporation on 40 DAS	77.60	10.35	25.87
T_5	Intercropping with fodder cowpea	94.31	12.57	31.44
T_6	Twin wheel hoe weeder weeding on 15 and 30 DAS	99.66	13.29	33.22
T_7	Hand weeding on 15 and 30 DAS	102.87	13.72	34.29

T_8	Unweeded control	76.07	10.14	25.36
	SEd	6.01	0.80	2.00
	CD (P=0.05)	12.89	1.72	4.30

Table 2: Nutrients removal by weeds in the experimental field at harvest (kg ha^{-1})

Treatment		N	P	K
T_1	Stale seed bed *fb* one hand weeding on 30 DAS	0.98	0.13	0.33
T_2	Stale seed bed *fb* twin wheel hoe weeder weeding on 30 DAS	1.34	0.18	0.45
T_3	Mulching with crop residues @ 5 t ha^{-1} applied at sowing	0.41	0.05	0.14
T_4	Intercropping with sunnhemp and incorporation on 40 DAS	1.34	0.18	0.45
T_5	Intercropping with fodder cowpea	2.81	0.38	0.94
T_6	Twin wheel hoe weeder weeding on 15 and 30 DAS	2.23	0.30	0.74
T_7	Hand weeding on 15 and 30 DAS	1.91	0.25	0.64
T_8	Unweeded control	4.26	0.57	1.42
	SEd	0.13	0.02	0.04
	CD (P=0.05)	0.28	0.04	0.09

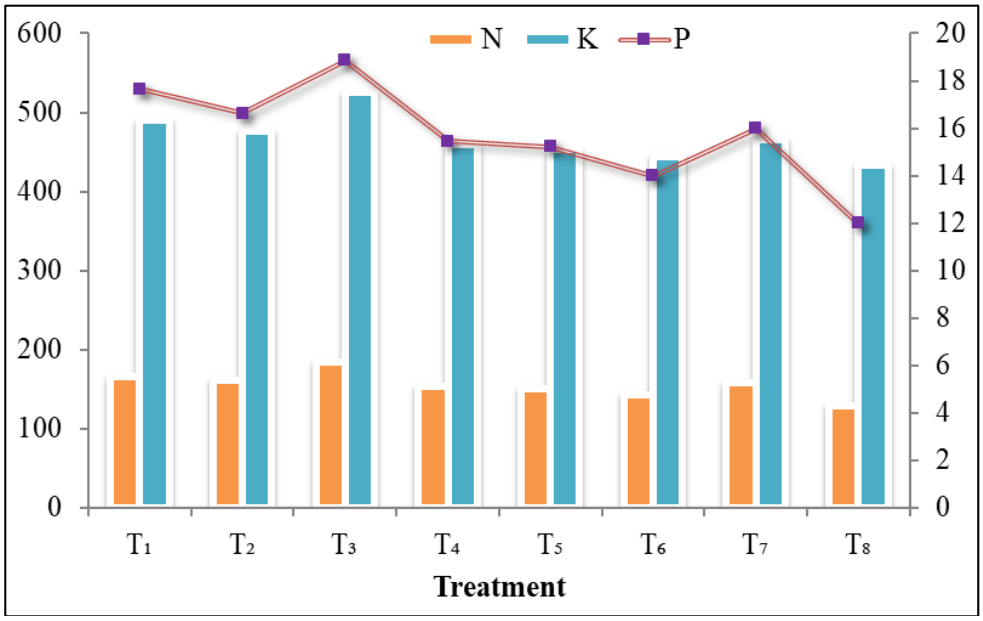

Fig 1: Post harvest soil nutrient status (kg ha^{-1})

Conclusion

Based on the experimental results, it could be concluded that, among the different weed management practices, application of mulching at the rate of 5 t ha^{-1} at sowing was found to be an ideal cultural practices to control weeds effectively because it recorded higher uptake of nutrients by maize and lower removal of nutrients by weeds.

References

1. Muhammad Ather Nadeem, Muhammad Awai, Muhammad Ayub, Muhammad Tahi, Muhammad Mudas. Integrated weed management studies for autumn planted Maize. Pak. J life Soc. Sci. 2010; 8(2):98-101.
2. Hassan AAA, Ahmed MKA. The influence of some herbicides and additional hoeing in maize growth and yield and yield components. Int. J Agric. Biol. 2005; 7(5):708-711.
3. Gnanavel I, Natarajan SK. Eco-friendly weed control option for sustainable agriculture: A Review. Agric. Rev. 2014; 35:172-183.
4. Sharma AR. Weed management in conservation agriculture systems - problems and prospects. Nat. Training on Adv. in Weed Manage. 2014, 1-9.
5. Kumar S. Biological control of terrestrial weeds. In: Training Manual Adv. Training in Weed Manage., held at DWSR, Jabalpur, on 14-23 January, 2014, 91-95.
6. Humphries EC. Mineral component and ash analysis. In: Modern methods of plant analysis, Springer Verlag, Berlin. 1956, 468-502.
7. Jackson MC. Soil chemical analysis. Prentice Hall of India Pvt. Ltd., New Delhi, India. 1973, 1-498.
9. Gomez KA, Gomez AA. Statistical procedures for agricultural research. (2nd Ed.), Wiley India Pvt Ltd., India, 1984.
10. Deepa S, Jayakumar P. Studies on uptake of N, P and K as influenced by different rates (doses) of pretilachlor in rice. Madras Agric. J. 2008; 95(7-12):333-338.
11. Shiv Mangal Prasad S, Mishra S, Singh SJ. Effect of established methods, fertility levels and weed management practices on rice. Indian J Agron. 2001; 46(2):216-221.
12. Payman G, Singh S. Effect of seed rate, spacing and herbicide use on weed management in direct seeded rice. Indian J Weed Sci. 2008; 40(1, 2):11-15.
13. Kumar D, Sachin G, Kumar R. Importance of mulch in crop production. Indian J Soil Conser. 1990; 18: 20-26.