

Weed dynamics in Maize (*Zea mays* L.) as influenced by *in situ* soil moisture conservation practices

B. Kalaivani, M. Thiruppathi*, R. Raman, and N. Senthilkumar

Department of Agronomy, Faculty Of Agriculture, Annamalai University,
Annamalai Nagar - 608002 (India)

*Corresponding author E-mail: agropathy@gmail.com

Abstract

Field experiment was conducted at a farmer's field in the Solatharam village, Cuddalore district, Tamil Nadu, India which is situated between 11° 39' N latitude, 79° 50' E longitude with an altitude of +5.79 m above mean sea level (MSL) in the southern part of India during June-September, 2022 to evaluate the effectiveness of different insitu soil moisture conservation with nitrogen management on the weed dynamics and weed control efficiency in irrigated maize (*Zea mays*).

The field experiment was laid out in split plot design with three replications and the soil of the experimental field was sandy loam soil in texture. In the main plot, control (no mulch plot) (M₁), hydrogel mulch (M₂) and water hyacinth mulch (M₃) were imposed. Whereas, in the sub plot, different levels and sources of nitrogen were applied at two levels viz., 100 and 125 % RDN in the combination of Prilled urea and Nano urea at varied proportion (1:0, 1:1, 2:1, 1:2 and 0:1). The nano urea were foliar sprayed at 20 and 40 DAS. The results indicated that mulching with water hyacinth @ 12 t ha⁻¹ (M₃) significantly decreased the individual weed population with higher weed control efficiency when compared to unmulched control plot (M₁). Different levels and sources of N management as well as their interaction effects didn't exhibited any significant effect on weeds population and weed control efficiency in maize.

Key words : Mulch, Weed dry matter, individual weed population, Weed control efficiency.

Maize (*Zea mays* L.) considered as the queen of the cereals, is one of the most important crops next to rice and wheat in global agriculture. Though maize is under cultivation in India, production and productivity are

comparatively lesser over temperate countries. Weeds cause yield reduction in maize up to 60%. Presence of weeds reduces the photosynthetic efficiency, dry matter production and its distribution to economical parts and there

by reduces sink capacity of crop resulting in poor grain yield⁵. The choice of any weed control measures, depends largely on its effectiveness and economics. Because of increased cost and non-availability of manual labour for hand weeding, mulching lessens weed development by preventing light (which is required by the sprouting weed seeds) from getting to the surface of the soil¹⁰ and acted more effectively against annual weed and some perennial weeds. It is cost effective practice of manipulating crop growing environment to increase yield and improve product quality by controlling weed growth, ameliorating soil temperature, conserving soil moisture, reducing soil erosion, improving soil structure and enhancing organic matter content under lesser time and reduced labour. However, in the current scenario of agriculture, evolving eco-friendly approach of weed control is more advisable to protect the natural resources such as soil flora and fauna including human being and animals in a holistic manner¹.

In this context, an advanced soil-moisture conservation techniques such as mulching emerged. Hence, the objective of this study was to explore the impact of mulches on weed management of maize cultivation.

The present study entitled efficacy of insitu soil moisture conservation for weed control in maize under irrigated conditions was carried out from June- September, 2021 at a farmer's field in solatharam village, cuddalore district, Tamil Nadu. The experimental farm is geographically situated between 11° 39 ' N latitude, 79° 50' E longitude with an altitude of +5.79 m above mean sea level (MSL) in the southern part of India. The soils of the

experimental field were sandy loam. The field experiment was laid out in split plot design with three replications. The maize hybrid NK 6523 was used as test crop and sowing with a spacing of 60×20 cm. In main plot, insitu soil moisture conservation techniques were adopted viz., M₁- Control, M₂-Hydrogel at 10 kg ha⁻¹ and M₃- Water Hyacinth at 12 t ha⁻¹. In subplot, nutrient management practices were imposed such as N₁ – Control, N₂ - 100% RDN as Prilled Urea (PU), N₃ - 100% RDN as Nano Urea (NU), N₄ - 75% RDN as PU + 25% as NU, N₅ -50% RDN as PU + 50% RDN as NU, N₆ - 25% RDN as PU + 75% NU, N₇-125% RDN as PU, N₈-125% RDN as NU, N₉- 100% RDN as PU + 25% as NU, N₁₀-75% RDN as PU + 50% as NU, N₁₁-50% RDN as PU + 75% as NU and N₁₂- 25% RDN as PU + 100% as NU. Nano urea were foliar sprayed at 20 and 40 DAS. Whereas, P₂O₅ and K₂O were supplied uniformly to all the treatmental plots through single super phosphate (P₂O₅) and muriate of potash (60% K₂O) respectively. The data on population of dominant weed flora (m⁻²), Weed control efficiency (WCE) (%), Dry weight of weed flora (g m⁻²) on 15 and 30 DAS were observed. The statistical analysis of the field data was done as per the methodology given by Gomez and Gomez⁷. The critical differences were worked out at 5% probability level by using ICAR WASP 2.0 tool, wherever the results were significant.

Weed flora :

The predominant weed flora found in the experimental field consist two species of grasses (*Cynodon dactylon* and *Echinochloa*

colonum), one species of sedge (*Cyperus rotundus*) and three species of broad-leaved weeds (*Amaranthus* sp, *Trianthema portulacastrum* and *Cleome viscosa*).

Effect of mulching on individual weed population :

Effect of different insitu soil moisture conservation (Tables-1 and 2) significantly influenced the individual weed population (no. m⁻²) at 15 and 30 DAS. Among the different insitu soil moisture conservation practices employed in this study, minimum weed population (no. m⁻²) of *Cynodon dactylon* (2.00 and 1.22), *Echinochloa colonum* (1.28 and 1.26), *Cyperus rotundus* (2.08 and 1.19), *Amaranthus* sp (1.92 and 0.95), *Trianthema portulacastrum* (4.44 and 2.10) and *Cleome viscosa* (1.24 and 1.26) were registered with water hyacinth mulch @ 12 t ha⁻¹ (M₃) at 15 and 30 DAS respectively and it was significantly superior over control. Water hyacinth reduces weed infestation through weed suppressing effect of mulch as result of limited amount of light reaching the soil sur-face and as a result reducing the germination and growth of weeds. This is in line with the findings of Devesh Pathak *et al.*,⁶. The highest weed population were recorded in unmulched control plot (M₁) viz., *Cynodon dactylon* (5.91 and 3.95), *Echinochloa colonum* (4.86 and 3.98), *Cyperus rotundus* (7.01 and 3.90), *Amaranthus* sp. (5.97 and 4.06), *Trianthema portulacastrum* (8.94 and 4.81) and *Cleome viscosa* (4.78 and 3.96) at 15 and 30 DAS, respectively. Statistical analysis on the data of individual weed population revealed that nutrient management and interaction effects were not significantly influenced by different treatments. It could be

infer that different levels and sources of N management does not significantly affected the weed population.

Effect of mulching on weed dry matter production :

Observations made on the occurrence of individual weed species dry matter production (g ha⁻¹) at 15 and 30 DAS are presented in Tables-3 and 4.

Minimum weed dry matter production of individual weed flora viz., (no. m⁻²) of *Cynodon dactylon* (0.47 and 1.17), *Echinochloa colonum* (1.18 and 0.71), *Cyperus rotundus* (2.06 and 1.08), *Amaranthus* sp (2.19 and 1.76), *Trianthema portulacastrum* (3.20 and 1.09) and *Cleome viscosa* (1.21 and 1.27) at 15 and 30 DAS, respectively were registered with water hyacinth mulch @ 12 t ha⁻¹ (M₃) which was significantly superior to rest of the treatments. This might be due to the highest reduction in incidence of individual weed under mulch might be attributed to the suppression of weed growth due to lack of sun light and because it has smothering effect on weed population by putting a physical barrier by imparting photosynthetic activity and inhibiting the top growth of weeds. These results are in accordance with the results of Kumar *et al.*,⁸ and Sharma and Kathiravan⁹. However, maximum weed dry matter production at 15 and 30 DAS were found under control such as *Cynodon dactylon* (5.94 and 4.16), *Echinochloa colonum* (4.25 and 3.08), *Cyperus rotundus* (7.26 and 4.92), *Amaranthus* sp (6.01 and 5.05), *Trianthema portulacastrum* (6.02 and 5.07) and *Cleome viscosa* (4.96 and 3.22) at 15 DAS and 30 DAS, respectively.

Table-1. Effect of *in situ* soil moisture conservation on population of dominant weed flora (m⁻²) on 15 DAS

Individual weed population 15 DAS						
Treatments	<i>Cynodan dactylon</i>	<i>Echinochloa colonum</i>	<i>Cyperus rotundus</i>	<i>Amaranthus sp.</i>	<i>Trianthema portulacastrum</i>	<i>Cleome viscosa</i>
In situ soil moisture conservation						
M₁	5.91 (2.53)	4.86 (2.31)	7.01 (2.74)	5.97 (2.54)	8.94 (3.07)	4.78 (2.30)
M₂	3.95 (2.11)	2.89 (1.84)	4.19 (2.17)	3.96 (2.11)	5.10 (2.36)	2.87 (1.83)
M₃	2.00 (1.59)	1.28 (1.33)	2.08 (1.66)	1.92 (1.55)	4.44 (1.83)	1.24 (1.32)
SE_D	0.04	0.04	0.16	0.06	0.13	0.05
CD (p=0.05)	0.11	0.10	0.45	0.17	0.36	0.15
Nitrogen management						
N₁	3.86 (2.04)	2.79 (1.77)	4.63 (2.21)	4.03 (2.70)	6.84 (2.70)	2.78 (2.70)
N₂	4.21 (2.12)	3.16 (1.87)	4.60 (2.23)	4.03 (2.71)	6.95 (2.71)	3.08 (2.71)
N₃	4.09 (2.08)	3.14 (1.87)	4.55 (2.20)	4.10 (2.66)	6.69 (2.66)	3.04 (2.66)
N₄	3.95 (2.07)	2.97 (1.82)	4.33 (2.15)	4.07 (2.54)	6.13 (2.54)	2.88 (2.54)
N₅	4.04 (2.06)	3.03 (1.84)	4.43 (2.18)	4.12 (2.61)	6.44 (2.61)	2.99 (2.61)
N₆	4.17 (2.11)	3.01 (1.82)	4.62 (2.23)	4.01 (2.67)	6.73 (2.67)	2.93 (2.67)
N₇	3.83 (2.06)	3.05 (1.84)	4.45 (2.21)	3.95 (2.42)	5.55 (2.42)	3.04 (2.42)
N₈	3.81 (2.06)	3.14 (1.87)	4.27 (2.13)	3.97 (2.51)	5.97 (2.51)	3.11 (2.51)
N₉	3.85 (2.07)	3.00 (1.83)	4.30 (2.15)	3.84 (2.42)	5.59 (2.42)	2.93 (2.42)
N₁₀	3.81 (2.08)	2.91 (1.81)	4.31 (2.19)	3.87 (2.45)	5.71 (2.45)	2.93 (2.45)
N₁₁	3.91 (2.07)	2.91 (1.80)	4.37 (2.20)	3.82 (2.45)	5.67 (2.45)	2.89 (2.45)
N₁₂	3.91 (2.07)	3.00 (1.83)	4.26 (2.16)	3.58 (2.44)	5.62 (2.44)	2.95 (2.44)
SE_D	0.14	0.13	0.14	0.05	0.11	0.05
CD (p=0.05)	NS	NS	NS	NS	NS	NS
Interaction Effects						
M₁N₁	5.71 (2.49)	4.68 (2.28)	7.45 (2.82)	5.98 (2.55)	8.93 (3.07)	4.57 (2.25)
M₁N₂	6.33 (2.61)	5.24 (2.40)	7.23 (2.78)	5.87 (2.52)	9.32 (3.13)	5.10 (2.37)
M₁N₃	6.22 (2.59)	5.15 (2.38)	7.19 (2.77)	5.75 (2.50)	9.23 (3.12)	5.04 (2.35)
M₁N₄	6.02 (2.55)	4.97 (2.34)	7.06 (2.75)	5.66 (2.48)	9.09 (3.10)	4.86 (2.32)
M₁N₅	6.14 (2.58)	5.06 (2.36)	7.15 (2.77)	5.53 (2.46)	9.12 (3.11)	5.05 (2.36)
M₁N₆	6.39 (2.62)	5.28 (2.40)	7.28 (2.79)	6.07 (2.56)	8.95 (3.07)	5.17 (2.38)
M₁N₇	5.56 (2.46)	4.74 (2.29)	6.92 (2.72)	6.10 (2.57)	8.51 (3.00)	4.63 (2.26)
M₁N₈	5.51 (2.45)	4.83 (2.31)	7.01 (2.74)	6.23 (2.59)	9.03 (3.09)	4.72 (2.28)
M₁N₉	5.81 (2.51)	4.63 (2.26)	6.56 (2.66)	6.34 (2.62)	8.91 (3.07)	4.52 (2.24)
M₁N₁₀	5.72 (2.49)	4.52 (2.24)	6.65 (2.67)	6.42 (2.63)	8.85 (3.06)	4.55 (2.25)
M₁N₁₁	5.64 (2.48)	4.59 (2.26)	6.74 (2.69)	6.11 (2.57)	8.74 (3.04)	4.51 (2.24)
M₁N₁₂	5.89 (2.53)	4.65 (2.27)	6.83 (2.71)	5.61 (2.47)	8.63 (3.02)	4.58 (2.25)
M₂N₁	4.30 (2.19)	2.52 (1.74)	4.25 (2.18)	4.02 (2.13)	6.03 (2.56)	2.59 (1.76)
M₂N₂	4.44 (2.22)	2.92 (1.85)	4.36 (2.21)	4.12 (2.15)	5.90 (2.53)	2.82 (1.82)
M₂N₃	4.37 (2.21)	2.73 (1.80)	4.19 (2.16)	4.23 (2.17)	5.59 (2.47)	2.63 (1.77)

M₂N₄	3.99 (2.12)	2.66 (1.78)	3.82 (2.08)	4.33 (2.20)	5.00 (2.35)	2.55 (1.75)
M₂N₅	4.20 (2.17)	2.55 (1.75)	4.02 (2.13)	4.42 (2.22)	5.26 (2.40)	2.51 (1.74)
M₂N₆	4.26 (2.18)	2.60 (1.76)	4.41 (2.22)	3.98 (2.12)	5.90 (2.53)	2.53 (1.74)
M₂N₇	3.52 (2.01)	3.18 (1.92)	4.38 (2.21)	3.87 (2.09)	4.41 (2.22)	3.28 (1.94)
M₂N₈	3.62 (2.03)	3.28 (1.94)	3.76 (2.06)	3.92 (2.10)	4.85 (2.31)	3.30 (1.95)
M₂N₉	3.72 (2.05)	3.09 (1.89)	4.34 (2.20)	3.56 (2.01)	4.67 (2.27)	3.06 (1.89)
M₂N₁₀	3.64 (2.03)	3.03 (1.88)	4.31 (2.19)	3.64 (2.03)	4.58 (2.25)	3.08 (1.89)
M₂N₁₁	3.60 (2.02)	3.04 (1.88)	4.45 (2.22)	3.77 (2.07)	4.50 (2.24)	3.07 (1.89)
M₂N₁₂	3.74 (2.06)	3.10 (1.90)	4.03 (2.13)	3.63 (2.03)	4.48 (2.23)	3.02 (1.88)
M₃N₁	1.58 (1.44)	1.18 (1.30)	2.19 (1.64)	2.09 (1.61)	3.71 (2.05)	1.17 (1.29)
M₃N₂	1.85 (1.53)	1.33 (1.35)	2.21 (1.72)	2.11 (1.62)	3.83 (2.08)	1.30 (1.34)
M₃N₃	1.67 (1.44)	1.54 (1.43)	2.27 (1.66)	2.32 (1.68)	3.56 (2.01)	1.44 (1.39)
M₃N₄	1.85 (1.53)	1.27 (1.33)	2.11 (1.61)	2.21 (1.65)	3.06 (1.89)	1.23 (1.31)
M₃N₅	1.77 (1.43)	1.48 (1.41)	2.12 (1.64)	2.40 (1.70)	2.88 (1.84)	1.41 (1.38)
M₃N₆	1.85 (1.53)	1.15 (1.28)	2.16 (1.68)	1.98 (1.57)	3.18 (1.92)	1.11 (1.27)
M₃N₇	2.40 (1.70)	1.23 (1.31)	2.06 (1.71)	1.87 (1.54)	2.58 (1.76)	1.21 (1.31)
M₃N₈	2.31 (1.71)	1.31 (1.35)	2.04 (1.58)	1.76 (1.50)	2.86 (1.83)	1.30 (1.34)
M₃N₉	2.01 (1.65)	1.28 (1.33)	2.01 (1.60)	1.62 (1.46)	1.82 (1.52)	1.22 (1.31)
M₃N₁₀	2.07 (1.72)	1.19 (1.30)	1.95 (1.70)	1.55 (1.43)	2.09 (1.61)	1.17 (1.29)
M₃N₁₁	2.49 (1.72)	1.10 (1.26)	1.93 (1.67)	1.59 (1.45)	2.62 (1.77)	1.09 (1.26)
M₃N₁₂	2.10 (1.61)	1.26 (1.33)	1.91 (1.64)	1.51 (1.42)	2.28 (1.67)	1.26 (1.33)
MXN						
SE_D	0.24	0.21	0.28	0.11	0.22	0.09
CD (p=0.05)	NS	NS	NS	NS	NS	NS
NXM						
SE_D	0.25	0.22	0.24	0.09	0.19	0.08
CD (p=0.05)	NS	NS	NS	NS	NS	NS

Table-2. Effect of *in situ* soil moisture conservation on population of dominant weed flora (m⁻²) on 30 DAS

Individual weed population 30 DAS						
Treatments	<i>Cynodan dactylon</i>	<i>Echinochloa colonum</i>	<i>Cyperus rotundus</i>	<i>Amaranthus</i> sp.	<i>Trianthema portulacastrum</i>	<i>Cleome viscosa</i>
In situ soil moisture conservation						
M₁	3.95 (2.11)	3.98 (2.12)	3.90 (2.10)	4.06 (2.14)	4.81 (2.30)	3.96 (2.11)
M₂	2.47 (1.72)	2.22 (1.65)	2.05 (1.59)	1.95 (1.56)	4.17 (1.89)	2.23 (1.65)
M₃	1.22 (1.31)	1.26 (1.33)	1.19 (1.30)	0.95 (1.20)	2.10 (1.29)	1.26 (1.33)
SE_D	0.03	0.01	0.07	0.09	0.14	0.05
CD (p=0.05)	0.09	0.03	0.21	0.27	0.38	0.14
Nitrogen management						
N₁	2.63 (1.73)	2.52 (1.70)	2.39 (1.66)	2.69 (2.70)	5.30 (1.81)	2.50 (2.70)

N ₂	2.49 (1.70)	2.55 (1.72)	2.55 (1.71)	2.62 (2.71)	4.29 (1.82)	2.50 (2.71)
N ₃	2.56 (1.71)	2.52 (1.72)	2.57 (1.71)	2.63 (2.66)	4.10 (1.77)	2.54 (2.66)
N ₄	2.54 (1.72)	2.40 (1.68)	2.70 (1.75)	2.53 (2.54)	3.52 (1.89)	2.36 (2.54)
N ₅	2.58 (1.72)	2.43 (1.69)	2.43 (1.68)	2.51 (2.61)	3.93 (1.91)	2.45 (2.61)
N ₆	2.45 (1.70)	2.47 (1.69)	2.37 (1.67)	2.35 (2.67)	4.35 (1.84)	2.49 (2.67)
N ₇	2.32 (1.65)	2.49 (1.69)	2.18 (1.60)	2.27 (2.42)	3.14 (1.86)	2.30 (2.42)
N ₈	2.45 (1.68)	2.60 (1.72)	2.21 (1.62)	2.18 (2.51)	3.14 (1.83)	2.63 (2.51)
N ₉	2.37 (1.66)	2.51 (1.70)	2.07 (1.57)	1.95 (2.42)	3.11 (1.68)	2.54 (2.42)
N ₁₀	2.59 (1.72)	2.42 (1.67)	2.48 (1.70)	1.92 (2.45)	3.10 (1.83)	2.48 (2.45)
N ₁₁	2.75 (1.77)	2.45 (1.68)	2.32 (1.65)	2.21 (2.45)	3.13 (1.85)	2.49 (2.45)
N ₁₂	2.84 (1.79)	2.48 (1.69)	2.27 (1.64)	1.98 (2.44)	3.20 (1.84)	2.50 (2.44)
SE _D	0.12	0.05	0.06	0.08	0.12	0.04
CD (p=0.05)	Ns	Ns	Ns	Ns	Ns	Ns
Interaction Effects						
M ₁ N ₁	4.39 (2.21)	4.21 (2.17)	4.12 (2.15)	4.49 (2.23)	5.05 (2.36)	4.19 (2.16)
M ₁ N ₂	3.86 (2.09)	3.78 (2.07)	4.20 (2.17)	4.44 (2.22)	4.61 (2.26)	3.68 (2.04)
M ₁ N ₃	4.35 (2.20)	3.64 (2.03)	4.31 (2.19)	4.34 (2.20)	4.52 (2.24)	3.74 (2.06)
M ₁ N ₄	4.00 (2.12)	3.70 (2.05)	4.41 (2.22)	4.23 (2.17)	4.88 (2.32)	3.61 (2.03)
M ₁ N ₅	4.22 (2.17)	3.55 (2.01)	3.98 (2.12)	4.11 (2.15)	4.76 (2.29)	3.59 (2.02)
M ₁ N ₆	3.54 (2.01)	3.75 (2.06)	3.87 (2.09)	4.10 (2.14)	4.48 (2.23)	3.79 (2.07)
M ₁ N ₇	3.63 (2.03)	4.27 (2.18)	3.76 (2.06)	4.09 (2.14)	4.85 (2.31)	3.60 (2.03)
M ₁ N ₈	3.93 (2.11)	4.35 (2.20)	3.55 (2.01)	3.88 (2.09)	4.28 (2.19)	4.40 (2.21)
M ₁ N ₉	3.76 (2.06)	4.17 (2.16)	3.63 (2.03)	3.76 (2.06)	5.57 (2.46)	4.21 (2.17)
M ₁ N ₁₀	4.16 (2.16)	4.07 (2.14)	3.71 (2.05)	3.55 (2.01)	4.83 (2.31)	4.16 (2.16)
M ₁ N ₁₁	3.62 (2.03)	4.13 (2.15)	3.69 (2.05)	3.97 (2.11)	4.86 (2.32)	4.27 (2.18)
M ₁ N ₁₂	3.97 (2.11)	4.19 (2.16)	3.55 (2.01)	3.81 (2.08)	5.00 (2.35)	4.23 (2.18)
M ₂ N ₁	2.21 (1.65)	2.18 (1.64)	2.03 (1.59)	2.08 (1.61)	2.73 (1.80)	2.14 (1.62)
M ₂ N ₂	2.39 (1.70)	2.52 (1.74)	2.33 (1.68)	2.10 (1.61)	3.04 (1.88)	2.50 (1.73)
M ₂ N ₃	2.12 (1.62)	2.41 (1.71)	2.21 (1.65)	2.32 (1.68)	2.68 (1.78)	2.42 (1.71)
M ₂ N ₄	2.18 (1.64)	2.23 (1.65)	2.41 (1.71)	2.20 (1.64)	2.98 (1.87)	2.25 (1.66)
M ₂ N ₅	2.14 (1.62)	2.32 (1.68)	1.97 (1.57)	2.41 (1.71)	3.29 (1.95)	2.35 (1.69)
M ₂ N ₆	2.38 (1.70)	2.55 (1.75)	1.87 (1.54)	1.97 (1.57)	3.13 (1.91)	2.51 (1.73)
M ₂ N ₇	2.25 (1.66)	2.01 (1.58)	1.75 (1.50)	1.85 (1.53)	3.38 (1.97)	2.08 (1.61)
M ₂ N ₈	2.37 (1.69)	2.15 (1.63)	1.65 (1.47)	1.91 (1.55)	3.30 (1.95)	2.19 (1.64)
M ₂ N ₉	2.33 (1.68)	2.11 (1.62)	1.56 (1.44)	1.55 (1.43)	2.60 (1.76)	2.16 (1.63)
M ₂ N ₁₀	2.48 (1.73)	2.02 (1.59)	2.38 (1.70)	1.62 (1.46)	3.41 (1.98)	2.08 (1.61)
M ₂ N ₁₁	3.40 (1.98)	2.09 (1.61)	2.27 (1.66)	1.76 (1.50)	3.44 (1.98)	2.05 (1.60)
M ₂ N ₁₂	3.30 (1.97)	2.01 (1.58)	2.14 (1.62)	1.62 (1.46)	3.00 (1.88)	2.01 (1.58)
M ₃ N ₁	1.30 (1.34)	1.17 (1.29)	1.02 (1.23)	1.49 (1.41)	1.11 (1.80)	2.10 (1.29)
M ₃ N ₂	1.23 (1.31)	1.35 (1.36)	1.11 (1.27)	1.33 (1.35)	1.22 (1.27)	1.16 (1.35)

M₃N₃	1.22 (1.31)	1.52 (1.42)	1.19 (1.30)	1.24 (1.32)	1.13 (1.31)	1.32 (1.40)
M₃N₄	1.43 (1.39)	1.25 (1.32)	1.29 (1.34)	1.17 (1.29)	1.71 (1.28)	1.47 (1.31)
M₃N₅	1.39 (1.37)	1.43 (1.39)	1.33 (1.35)	1.01 (1.23)	1.73 (1.49)	1.22 (1.38)
M₃N₆	1.41 (1.38)	1.12 (1.27)	1.38 (1.37)	0.98 (1.22)	1.42 (1.49)	1.40 (1.29)
M₃N₇	1.07 (1.25)	1.20 (1.30)	1.04 (1.24)	0.86 (1.17)	1.17 (1.39)	1.16 (1.31)
M₃N₈	1.04 (1.24)	1.30 (1.34)	1.42 (1.39)	0.75 (1.12)	1.34 (1.29)	1.22 (1.35)
M₃N₉	1.01 (1.23)	1.25 (1.32)	1.01 (1.23)	0.53 (1.01)	0.15 (1.36)	1.31 (1.32)
M₃N₁₀	1.13 (1.28)	1.17 (1.29)	1.35 (1.36)	0.59 (1.04)	0.95 (0.81)	1.24 (1.30)
M₃N₁₁	1.23 (1.32)	1.12 (1.27)	1.00 (1.22)	0.91 (1.19)	1.09 (1.20)	1.19 (1.28)
M₃N₁₂	1.16 (1.29)	1.24 (1.32)	1.13 (1.28)	0.50 (1.00)	1.17 (1.26)	1.15 (1.33)
MXN						
SE_D	0.19	0.09	0.13	0.17	0.24	0.09
CD (p=0.05)	Ns	Ns	Ns	Ns	Ns	Ns
NXM						
SE_D	0.21	0.09	0.11	0.14	0.20	0.07
CD (p=0.05)	Ns	Ns	Ns	Ns	Ns	Ns

Table-3. Effect of *in situ* soil moisture conservation Dry weight of weed flora (g m⁻²) @15 DAS

Dry weight basis 15 DAS						
Treatments	<i>Cynodan dactylon</i>	<i>Echinocloa colonum</i>	<i>Cyperus rotundus</i>	<i>Amar-anthus sp.</i>	<i>Trianthema portulacastrum</i>	<i>Cleome viscosa</i>
In situ soil moisture conservation						
M₁	5.94 (2.54)	4.25 (2.18)	7.26 (2.78)	6.01 (2.55)	6.02 (2.55)	4.96 (2.34)
M₂	4.13 (2.15)	2.20 (1.64)	3.17 (1.92)	3.97 (2.11)	4.91 (2.33)	1.92 (1.55)
M₃	0.47 (0.98)	1.18 (1.30)	2.06 (1.60)	2.19 (1.64)	3.20 (1.92)	1.21 (1.31)
SE_D	0.11	0.10	0.94	0.12	0.02	0.10
CD (p=0.05)	0.31	0.28	2.61	0.34	0.04	0.28
Nitrogen management						
N₁	3.39 (1.84)	2.56 (1.50)	4.48 (2.18)	4.21 (2.13)	4.88 (2.31)	2.79 (1.76)
N₂	3.40 (1.85)	2.58 (1.51)	4.22 (2.11)	4.17 (2.12)	4.89 (2.31)	2.92 (1.79)
N₃	3.49 (1.89)	2.59 (1.52)	4.48 (2.19)	4.22 (2.13)	4.93 (2.32)	2.96 (1.80)
N₄	3.72 (1.97)	2.66 (1.53)	4.19 (2.11)	4.21 (2.14)	4.99 (2.33)	2.97 (1.81)
N₅	3.67 (1.95)	2.54 (1.54)	4.21 (2.11)	4.17 (2.13)	4.94 (2.31)	2.96 (1.80)
N₆	3.77 (1.96)	2.53 (1.53)	4.19 (2.11)	4.23 (2.14)	4.69 (2.26)	2.74 (1.74)
N₇	3.61 (1.92)	2.54 (1.51)	4.17 (2.10)	4.15 (2.13)	4.57 (2.24)	2.70 (1.74)
N₈	3.49 (1.89)	2.55 (1.45)	4.16 (2.10)	3.82 (2.05)	4.53 (2.23)	2.39 (1.65)
N₉	3.43 (1.87)	2.55 (1.44)	3.96 (2.05)	3.79 (2.04)	4.45 (2.21)	2.55 (1.69)
N₁₀	3.41 (1.85)	2.55 (1.45)	4.05 (2.06)	3.96 (2.09)	4.50 (2.23)	2.51 (1.68)
N₁₁	3.39 (1.85)	2.53 (1.48)	3.98 (2.04)	3.93 (2.07)	4.56 (2.23)	2.44 (1.66)
N₁₂	3.35 (1.82)	2.35 (1.50)	3.87 (2.02)	3.82 (2.05)	4.59 (2.24)	2.43 (1.66)
SE_D	0.09	0.09	0.81	0.10	0.06	0.09
CD (p=0.05)	NS	NS	NS	NS	NS	NS

Interaction Effect						
M₁N₁	5.67 (2.48)	4.35 (2.20)	7.45 (2.82)	6.29 (2.61)	6.15 (2.58)	5.12 (2.37)
M₁N₂	5.61 (2.47)	4.39 (2.21)	7.34 (2.80)	6.33 (2.61)	6.27 (2.60)	5.23 (2.39)
M₁N₃	5.72 (2.49)	4.44 (2.22)	7.39 (2.81)	6.45 (2.64)	6.32 (2.61)	5.32 (2.41)
M₁N₄	5.88 (2.53)	4.49 (2.23)	7.23 (2.78)	6.12 (2.57)	6.44 (2.63)	5.37 (2.42)
M₁N₅	5.80 (2.51)	4.29 (2.19)	7.20 (2.77)	6.19 (2.590)	6.49 (2.64)	5.41 (2.43)
M₁N₆	6.31 (2.61)	4.21 (2.17)	7.17 (2.77)	6.14 (2.58)	5.97 (2.54)	5.19 (2.39)
M₁N₇	6.03 (2.56)	4.25 (2.18)	7.12 (2.76)	6.10 (2.57)	5.82 (2.51)	5.03 (2.35)
M₁N₈	5.94 (2.54)	4.18 (2.16)	7.06 (2.75)	5.54 (2.46)	5.75 (2.50)	4.51 (2.24)
M₁N₉	5.94 (2.54)	4.17 (2.16)	7.01 (2.74)	5.66 (2.48)	5.69 (2.49)	4.66 (2.27)
M₁N₁₀	6.12 (2.57)	4.12 (2.15)	7.49 (2.83)	5.78 (2.51)	5.58 (2.47)	4.57 (2.25)
M₁N₁₁	6.04 (2.56)	4.09 (2.14)	7.42 (2.81)	5.98 (2.55)	5.79 (2.51)	4.51 (2.24)
M₁N₁₂	6.16 (2.58)	4.01 (2.12)	7.19 (2.77)	5.58 (2.47)	5.91 (2.53)	4.59 (2.26)
M₂N₁	4.27 (2.18)	2.08 (1.61)	3.16 (1.91)	4.25 (2.18)	5.08 (2.36)	2.07 (1.60)
M₂N₂	4.29 (2.19)	2.06 (1.60)	3.22 (1.93)	4.07 (2.14)	5.01 (2.35)	2.33 (1.68)
M₂N₃	4.33 (2.20)	2.01 (1.58)	3.27 (1.94)	4.09 (2.14)	5.04 (2.35)	2.28 (1.67)
M₂N₄	4.41 (2.22)	2.11 (1.62)	3.34 (1.96)	4.18 (2.16)	5.06 (2.36)	2.21 (1.65)
M₂N₅	4.47 (2.23)	2.13 (1.62)	3.39 (1.97)	4.12 (2.15)	5.09 (2.36)	2.10 (1.61)
M₂N₆	4.39 (2.21)	2.19 (1.64)	3.42 (1.98)	4.15 (2.16)	4.98 (2.34)	1.61 (1.45)
M₂N₇	4.21 (2.17)	2.22 (1.65)	3.48 (1.99)	3.91 (2.10)	4.88 (2.32)	1.59 (1.45)
M₂N₈	3.99 (2.12)	2.33 (1.68)	3.49 (2.00)	3.88 (2.09)	4.75 (2.29)	1.54 (1.43)
M₂N₉	3.92 (2.10)	2.38 (1.70)	2.98 (1.87)	3.71 (2.05)	4.65 (2.27)	1.98 (1.57)
M₂N₁₀	3.76 (2.06)	2.44 (1.71)	2.86 (1.83)	3.64 (2.03)	4.55 (2.25)	1.87 (1.54)
M₂N₁₁	3.82 (2.08)	2.48 (1.73)	2.75 (1.80)	3.77 (2.07)	4.91 (2.33)	1.76 (1.50)
M₂N₁₂	3.65 (2.04)	2.02 (1.59)	2.71 (1.79)	3.82 (2.08)	4.95 (2.33)	1.66 (1.47)
M₃N₁	0.2 (0.85)	1.24 (1.32)	2.82 (1.82)	2.09 (1.61)	3.41 (1.98)	1.17 (1.29)
M₃N₂	0.29 (0.89)	1.29 (1.34)	2.09 (1.61)	2.11 (1.62)	3.38 (1.97)	1.21 (1.31)
M₃N₃	0.43 (0.96)	1.33 (1.35)	2.78 (1.81)	2.12 (1.62)	3.44 (1.98)	1.28 (1.33)
M₃N₄	0.87 (1.17)	1.38 (1.37)	2.01 (1.58)	2.33 (1.68)	3.48 (1.99)	1.32 (1.35)
M₃N₅	0.74 (1.11)	1.20 (1.30)	2.05 (1.60)	2.21 (1.65)	3.24 (1.93)	1.36 (1.36)
M₃N₆	0.61 (1.05)	1.19 (1.30)	1.98 (1.57)	2.39 (1.70)	3.12 (1.90)	1.43 (1.39)
M₃N₇	0.58 (1.04)	1.16 (1.29)	1.91 (1.55)	2.44 (1.71)	3.01 (1.87)	1.49 (1.41)
M₃N₈	0.55 (1.02)	1.14 (1.28)	1.94 (1.56)	2.05 (1.60)	3.08 (1.89)	1.11 (1.27)
M₃N₉	0.43 (0.96)	1.11 (1.27)	1.88 (1.54)	2.01 (1.58)	3.01 (1.87)	1.01 (1.23)
M₃N₁₀	0.34 (0.92)	1.09 (1.26)	1.81 (1.52)	2.47 (1.72)	3.36 (1.96)	1.08 (1.26)
M₃N₁₁	0.31 (0.90)	1.03 (1.24)	1.76 (1.50)	2.03 (1.59)	2.99 (1.87)	1.04 (1.24)
M₃N₁₂	0.23 (0.85)	1.01 (1.23)	1.70 (1.48)	2.06 (1.60)	2.91 (1.85)	1.05 (1.24)
MXN						
SE_D	0.19	0.18	1.63	0.22	0.11	0.18
CD (p=0.05)	NS	NS	NS	NS	NS	NS
NXM						
SE_D	0.17	0.15	1.39	0.18	0.11	0.15
CD (p=0.05)	NS	NS	NS	NS	NS	NS

Table-4. Effect of mulching practice on Dry weight of weed flora (g m⁻²) @30 DAS

Dry weight basis 30 DAS						
Treatments	<i>Cynodan dactylon</i>	<i>Echinocloa colonum</i>	<i>Cyperus rotundus</i>	<i>Amar-anthus sp.</i>	<i>Trianthema portulacastrum</i>	<i>Cleome viscosa</i>
In situ soil moisture conservation						
M₁	4.16 (2.16)	3.08 (1.89)	4.92 (2.33)	5.05 (2.36)	5.07 (2.36)	3.22 (1.93)
M₂	2.25 (1.66)	1.73 (1.49)	2.08 (1.61)	3.02 (1.87)	3.06 (1.89)	2.19 (1.64)
M₃	1.17 (1.29)	0.71 (1.10)	1.08 (1.25)	1.76 (1.50)	1.09 (1.26)	1.27 (1.33)
SE_D	0.10	0.07	0.10	0.11	0.10	0.09
CD (p=0.05)	0.28	0.20	0.28	0.31	0.28	0.27
Nitrogen management						
N₁	2.67 (1.74)	1.88 (1.50)	2.76 (1.75)	3.40 (1.95)	3.07 (1.83)	2.22 (1.63)
N₂	2.69 (1.75)	1.91 (1.51)	2.78 (1.75)	3.39 (1.94)	3.13 (1.85)	2.39 (1.68)
N₃	2.67 (1.74)	1.94 (1.52)	2.84 (1.78)	3.42 (1.95)	3.08 (1.83)	2.27 (1.65)
N₄	2.68 (1.75)	1.95 (1.53)	2.91 (1.80)	3.38 (1.94)	3.22 (1.88)	2.35 (1.67)
N₅	2.61 (1.73)	1.99 (1.54)	2.92 (1.80)	3.36 (1.93)	3.25 (1.89)	2.36 (1.67)
N₆	2.57 (1.71)	1.95 (1.53)	2.93 (1.80)	3.34 (1.92)	3.22 (1.87)	2.41 (1.69)
N₇	2.54 (1.70)	1.90 (1.51)	2.72 (1.75)	3.35 (1.92)	3.32 (1.90)	2.18 (1.62)
N₈	2.56 (1.71)	1.66 (1.45)	2.66 (1.72)	3.18 (1.89)	2.98 (1.81)	2.18 (1.62)
N₉	2.38 (1.66)	1.66 (1.44)	2.50 (1.67)	3.22 (1.90)	2.97 (1.81)	2.13 (1.60)
N₁₀	2.38 (1.66)	1.68 (1.45)	2.46 (1.66)	3.14 (1.88)	2.96 (1.81)	2.12 (1.60)
N₁₁	2.30 (1.64)	1.77 (1.48)	2.43 (1.64)	3.07 (1.86)	2.95 (1.80)	2.08 (1.58)
N₁₂	2.28 (1.63)	1.84 (1.50)	2.41 (1.63)	3.05 (1.86)	2.73 (1.74)	2.03 (1.57)
SE_D	0.09	0.06	0.09	0.09	0.08	0.08
CD (p=0.05)	NS	NS	NS	NS	NS	NS
Interaction Effects						
M₁N₁	4.33 (2.20)	3.22 (1.93)	5.09 (2.36)	5.09 (2.36)	5.14 (2.37)	3.33 (1.96)
M₁N₂	4.43 (2.22)	3.28 (1.94)	5.05 (2.36)	5.12 (2.37)	5.18 (2.38)	3.44 (1.99)
M₁N₃	4.48 (2.23)	3.19 (1.92)	5.01 (2.35)	5.18 (2.38)	5.08 (2.36)	3.22 (1.93)
M₁N₄	4.38 (2.21)	3.31 (1.95)	5.12 (2.37)	5.23 (2.39)	5.21 (2.39)	3.28 (1.94)
M₁N₅	4.27 (2.18)	3.42 (1.98)	5.15 (2.38)	5.32 (2.41)	5.24 (2.40)	3.31 (1.95)
M₁N₆	4.28 (2.19)	3.38 (1.97)	5.18 (2.38)	5.39 (2.43)	5.32 (2.41)	3.39 (1.97)
M₁N₇	4.25 (2.18)	3.34 (1.96)	4.55 (2.25)	5.44 (2.44)	5.43 (2.44)	3.12 (1.90)
M₁N₈	4.21 (2.17)	2.58 (1.75)	4.92 (2.33)	4.86 (2.32)	4.67 (2.27)	3.18 (1.92)
M₁N₉	3.97 (2.11)	2.67 (1.78)	4.87 (2.32)	4.98 (2.34)	4.89 (2.32)	3.12 (1.90)
M₁N₁₀	3.88 (2.09)	2.76 (1.81)	4.76 (2.29)	4.77 (2.30)	4.92 (2.33)	3.10 (1.90)
M₁N₁₁	3.75 (2.06)	2.88 (1.84)	4.72 (2.28)	4.65 (2.27)	4.97 (2.34)	3.09 (1.89)
M₁N₁₂	3.71 (2.05)	2.98 (1.87)	4.61 (2.26)	4.58 (2.25)	4.73 (2.29)	3.02 (1.88)
M₂N₁	2.44 (1.71)	1.88 (1.54)	2.11 (1.62)	3.22 (1.93)	3.01 (1.87)	2.21 (1.65)
M₂N₂	2.39 (1.70)	1.86 (1.54)	2.19 (1.64)	3.20 (1.92)	3.09 (1.89)	2.32 (1.68)
M₂N₃	2.24 (1.66)	1.98 (1.57)	2.23 (1.65)	3.18 (1.92)	3.12 (1.90)	2.11 (1.62)
M₂N₄	2.32 (1.68)	1.81 (1.52)	2.30 (1.67)	3.12 (1.90)	3.19 (1.92)	2.39 (1.70)
M₂N₅	2.12 (1.62)	1.78 (1.51)	2.33 (1.68)	3.10 (1.90)	3.21 (1.93)	2.44 (1.71)
M₂N₆	2.31 (1.68)	1.67 (1.47)	2.39 (1.70)	3.07 (1.89)	3.33 (1.96)	2.41 (1.73)

M₂N₇	2.28 (1.67)	1.55 (1.43)	2.44 (1.71)	3.03 (1.88)	3.28 (1.94)	2.12 (1.62)
M₂N₈	2.33 (1.68)	1.52 (1.42)	1.72 (1.49)	3.01 (1.87)	3.22 (1.93)	2.08 (1.61)
M₂N₉	2.15 (1.63)	1.54 (1.43)	1.67 (1.47)	2.98 (1.87)	2.97 (1.86)	2.02 (1.59)
M₂N₁₀	2.19 (1.64)	1.64 (1.46)	1.78 (1.51)	2.87 (1.84)	2.87 (1.84)	2.07 (1.60)
M₂N₁₁	2.11 (1.62)	1.75 (1.50)	1.86 (1.54)	2.76 (1.81)	2.77 (1.81)	2.03 (1.59)
M₂N₁₂	2.08 (1.61)	1.82 (1.52)	1.98 (1.57)	2.66 (1.78)	2.65 (1.77)	2.01 (1.58)
M₃N₁	1.23 (1.32)	0.55 (1.02)	1.09 (1.26)	1.89 (1.55)	1.07 (1.25)	1.12 (1.27)
M₃N₂	1.25 (1.32)	0.59 (1.04)	1.11 (1.27)	1.86 (1.54)	1.11 (1.27)	1.40 (1.38)
M₃N₃	1.29 (1.34)	0.64 (1.07)	1.27 (1.33)	1.91 (1.55)	1.03 (1.24)	1.48 (1.41)
M₃N₄	1.33 (1.35)	0.72 (1.10)	1.31 (1.35)	1.78 (1.51)	1.25 (1.32)	1.37 (1.37)
M₃N₅	1.45 (1.40)	0.77 (1.13)	1.29 (1.34)	1.65 (1.47)	1.31 (1.35)	1.32 (1.35)
M₃N₆	1.11 (1.27)	0.79 (1.14)	1.21 (1.31)	1.55 (1.43)	1.02 (1.23)	1.35 (1.36)
M₃N₇	1.09 (1.26)	0.81 (1.14)	1.18 (1.30)	1.59 (1.45)	1.24 (1.32)	1.31 (1.35)
M₃N₈	1.14 (1.28)	0.87 (1.17)	1.33 (1.35)	1.67 (1.47)	1.04 (1.24)	1.29 (1.34)
M₃N₉	1.01 (1.23)	0.76 (1.12)	0.96 (1.21)	1.70 (1.48)	1.05 (1.24)	1.24 (1.32)
M₃N₁₀	1.08 (1.26)	0.65 (1.07)	0.85 (1.16)	1.78 (1.51)	1.08 (1.26)	1.20 (1.30)
M₃N₁₁	1.04 (1.24)	0.69 (1.09)	0.72 (1.10)	1.81 (1.52)	1.10 (1.26)	1.11 (1.27)
M₃N₁₂	1.05 (1.24)	0.71 (1.10)	0.63 (1.06)	1.90 (1.55)	0.81 (1.14)	1.07 (1.25)
MXN						
SE_D	0.18	0.13	0.18	0.20	0.18	0.17
CD (p=0.05)	NS	NS	NS	NS	NS	NS
NXM						
SE_D	0.15	0.11	0.15	0.17	0.15	0.14
CD (p=0.05)	NS	NS	NS	NS	NS	NS

However, statistically the nutrient management and interaction effects were not significantly influenced the dry matter production of individual weed flora.

Effect of mulching on weed control efficiency :

Effect of different insitu soil moisture conservation (Tables-5 and 6) significantly influenced the Weed control efficiency of individual weeds based on the population (%) at 15 and 30 DAS.

Adoption of *in situ* soil moisture conservation practices with water hyacinth mulch @ 12 t ha⁻¹ (M₃) resulted maximum

WCE (%) at 15 and 30 DAS *viz.*, *Cynodon dactylon* (65.99 and 77.99), *Echinochloa colonum* (73.75 and 68.11), *Cyperus rotundus* (70.33 and 69.35), *Amaranthus* sp. (67.64 and 77.09), *Trianthema portulacastrum* (50.53 and 76.69) and *Cleome viscosa* (73.98 and 67.90), respectively which was significantly superior over control. This is due to the beneficial effect of mulching in controlling weeds has resulted from delayed emergence of weeds and by restricted photosynthesis of weeds due to lack of percentage of light through mulch and shading by crop plants which further leads to a reduction in the weed growth under the mulches. Such trends have also been reported by Agarwal *et al.*,² and Ali *et al.*,⁴. The lowest weed control efficiency were

Table-5. Effect of *in situ* soil moisture conservation on WCE (%) of individual weed species on 15 DAS

Weed Control Efficiency 15 DAS						
Treatments	<i>Cynodan dactylon</i>	<i>Echinocloa colonum</i>	<i>Cyperus rotundus</i>	<i>Amar-anthus sp.</i>	<i>Trianthema portulacastrum</i>	<i>Cleome viscosa</i>
In situ soil moisture conservation						
M₁	0.00	0.00	0.00	0.00	0.00	0.00
M₂	33.26 (35.19)	40.24 (39.31)	40.03 (39.23)	35.26 (36.35)	43.08 (40.99)	39.58 (38.90)
M₃	65.99 (54.40)	73.75 (59.20)	70.33 (56.99)	67.64 (55.42)	50.53 (55.63)	73.98 (59.35)
SE_D	0.57	0.63	1.90	2.72	3.82	2.43
CD (p=0.05)	1.59	1.75	5.28	7.55	10.61	6.74
Nitrogen management						
N₁	32.32 (29.34)	40.33 (34.23)	37.86 (2.70)	32.61 (2.70)	23.40 (28.20)	39.23 (2.70)
N₂	33.55 (30.13)	39.64 (33.83)	36.34 (2.71)	31.29 (2.71)	25.43 (29.14)	39.89 (2.71)
N₃	34.32 (30.62)	39.03 (33.38)	36.73 (2.66)	28.70 (2.66)	27.48 (30.17)	39.75 (2.66)
N₄	34.33 (30.61)	40.31 (34.21)	38.60 (2.54)	28.15 (2.54)	32.62 (32.21)	40.74 (2.54)
N₅	34.27 (30.59)	40.11 (34.00)	38.04 (2.61)	32.63 (2.61)	29.34 (32.12)	40.78 (2.61)
N₆	34.79 (30.90)	43.02 (35.89)	36.56 (2.67)	33.94 (2.67)	24.78 (29.72)	43.23 (2.67)
N₇	31.16 (28.73)	35.71 (31.50)	35.66 (2.42)	35.30 (2.42)	34.77 (33.50)	34.40 (2.42)
N₈	30.82 (28.51)	35.00 (31.04)	39.09 (2.51)	36.28 (2.51)	33.93 (32.88)	34.19 (2.51)
N₉	33.78 (30.27)	35.23 (31.18)	34.42 (2.42)	39.43 (2.42)	37.22 (35.58)	35.08 (2.42)
N₁₀	33.41 (30.05)	35.56 (31.40)	35.26 (2.45)	39.72 (2.45)	35.47 (34.97)	35.52 (2.45)
N₁₁	30.67 (28.44)	36.59 (32.07)	35.13 (2.45)	37.42 (2.45)	35.17 (33.66)	35.91 (2.45)
N₁₂	33.59 (30.15)	35.42 (31.30)	37.66 (2.44)	36.13 (2.44)	34.83 (34.34)	35.52 (2.44)
SE_D	2.05	2.25	1.63	2.33	3.27	2.08
CD (p=0.05)	Ns	Ns	Ns	Ns	Ns	Ns
Interaction effects						
M₁N₁	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₃	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₄	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₅	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₆	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₇	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₈	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₉	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₀	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₁	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₂N₁	24.66 (29.77)	46.17 (42.80)	42.92 (40.93)	32.78 (34.92)	32.47 (34.74)	43.24 (41.11)
M₂N₂	29.92 (33.16)	44.32 (41.74)	39.63 (39.02)	29.81 (33.09)	36.73 (37.30)	45.08 (42.18)
M₂N₃	29.76 (33.06)	47.04 (43.30)	41.77 (40.26)	26.43 (30.94)	39.40 (38.88)	47.87 (43.78)
M₂N₄	33.74 (35.51)	46.45 (42.96)	45.92 (42.66)	23.50 (29.00)	44.96 (42.11)	47.50 (43.57)
M₂N₅	31.68 (34.25)	49.59 (44.77)	43.77 (41.42)	41.81 (40.29)	42.34 (40.59)	50.28 (45.16)

M₂N₆	33.28 (35.23)	50.81 (45.46)	39.37 (38.86)	34.43 (35.93)	34.12 (35.74)	51.11 (45.64)
M₂N₇	36.64 (37.25)	33.01 (35.07)	36.69 (37.28)	36.56 (37.20)	48.13 (43.93)	29.26 (32.74)
M₂N₈	34.37 (35.89)	32.15 (34.54)	46.37 (42.92)	37.08 (37.51)	46.32 (42.89)	30.15 (33.30)
M₂N₉	36.01 (36.87)	33.34 (35.27)	33.86 (35.58)	43.85 (41.47)	47.60 (43.62)	32.26 (34.61)
M₂N₁₀	36.43 (37.13)	33.01 (35.07)	35.14 (36.36)	43.30 (41.15)	48.26 (44.00)	32.29 (34.63)
M₂N₁₁	36.22 (37.00)	33.68 (35.48)	33.98 (35.65)	38.30 (38.23)	48.52 (44.15)	31.84 (34.35)
M₂N₁₂	36.43 (37.13)	33.34 (35.27)	40.95 (39.79)	35.29 (36.45)	48.13 (43.93)	34.07 (35.71)
M₃N₁	72.30 (58.24)	74.83 (59.88)	70.65 (57.20)	65.05 (53.76)	58.44 (49.86)	74.44 (59.63)
M₃N₂	70.72 (57.24)	74.61 (59.74)	69.38 (56.40)	64.05 (53.16)	58.88 (50.12)	74.58 (59.73)
M₃N₃	73.19 (58.82)	70.06 (56.83)	68.42 (55.81)	59.65 (50.57)	61.45 (51.62)	71.39 (57.66)
M₃N₄	69.24 (56.32)	74.49 (59.66)	70.14 (56.88)	60.95 (51.33)	66.31 (54.52)	74.73 (59.82)
M₃N₅	71.15 (57.51)	70.73 (57.24)	70.35 (57.01)	56.09 (48.50)	68.37 (55.78)	72.05 (58.09)
M₃N₆	71.08 (57.47)	78.27 (62.21)	70.32 (56.99)	67.38 (55.17)	64.47 (53.41)	78.58 (62.43)
M₃N₇	56.83 (48.93)	74.14 (59.43)	70.28 (56.97)	69.34 (56.38)	69.65 (56.57)	73.96 (59.31)
M₃N₈	58.08 (49.65)	72.84 (58.59)	70.90 (57.35)	71.75 (57.89)	68.31 (55.74)	72.41 (58.32)
M₃N₉	65.34 (53.93)	72.33 (58.26)	69.41 (56.42)	74.45 (59.64)	79.57 (63.13)	72.99 (58.68)
M₃N₁₀	63.81 (53.02)	73.66 (59.12)	70.63 (57.18)	75.86 (60.57)	76.35 (60.90)	74.27 (59.52)
M₃N₁₁	55.81 (48.33)	76.10 (60.73)	71.40 (57.67)	73.98 (59.33)	70.05 (56.82)	75.89 (60.59)
M₃N₁₂	64.35 (53.34)	72.91 (58.64)	72.04 (58.07)	73.08 (58.75)	73.61 (59.09)	72.50 (58.37)
MXN						
SE_D	3.45	3.79	3.30	4.73	6.64	4.21
CD (p=0.05)	Ns	Ns	Ns	Ns	Ns	Ns
NXM						
SE_D	3.55	3.90	2.82	4.03	5.67	3.60
CD (p=0.05)	Ns	Ns	Ns	Ns	Ns	Ns

recorded in unmulched control plot (M₁). Similarly, the nutrient management and interaction effects were not significantly influenced on the WCE at both the stages of observation.

Effect of mulching on Weed control index :

Effect of different *in situ* soil moisture conservation (Tables 7 and 8) significantly influenced the Weed control index (%) at 15 and 30 DAS.

The maximum weed control index on dry weight basis (%) at 15 and 30 DAS observation on *Cynodon dactylon* (92.12 and

71.86), *Echinochloa colonum* (76.62 and 76.62), *Cyperus rotundus* (71.63 and 78.15), *Amaranthus* sp (63.48 and 65.04), *Trianthema portulacastrum* (46.73 and 78.46) and *Cleome viscosa* (75.60 and 60.50), respectively were observed with water hyacinth mulch @ 12 t ha⁻¹ (M₃). This might be attributed due to mulch helps in maintaining the moisture as well as congenial condition, *i.e.* optimum temperature for better growth of the crop. Amoroso *et al.*³ reported that mulch controls the weeds by smothering, prevent day light which helps foster germination from reaching weed seeds and prevent the weed growth. The lowest weed control efficiency were recorded in unmulched control plot (M₁). There is no

Table-6 Effect of *in situ* soil moisture conservation on WCE (%) on individual weed species @ 30 DAS

Weed Control Efficiency 30 DAS						
Treatments	<i>Cynodan dactylon</i>	<i>Echinochloa colonum</i>	<i>Cyperus rotundus</i>	<i>Amar-anthus sp.</i>	<i>Trianthema portulacastrum</i>	<i>Cleome viscosa</i>
In situ soil moisture conservation						
M₁	0.00	0.00	0.00	0.00	0.00	0.00
M₂	55.24 (48.05)	43.87 (41.42)	47.49 (43.54)	52.17 (46.25)	53.45 (36.38)	43.15 (41.01)
M₃	77.99 (62.09)	68.11 (55.67)	69.35 (56.44)	77.09 (61.61)	76.69 (60.58)	67.90 (55.53)
SE_D	0.83	0.57	0.64	2.13	4.79	1.91
CD (p=0.05)	2.32	1.59	1.78	5.92	13.31	5.29
Nitrogen management						
N₁	39.99 (33.93)	40.16 (34.06)	41.99 (35.19)	40.16 (33.98)	26.20 (34.91)	40.38 (34.19)
N₂	47.63 (38.66)	32.54 (29.52)	39.49 (33.72)	40.92 (34.46)	37.11 (31.56)	32.07 (29.23)
N₃	48.76 (39.33)	30.68 (28.43)	40.37 (34.19)	39.32 (33.57)	38.44 (33.18)	32.00 (29.21)
N₄	46.66 (37.93)	35.40 (31.23)	38.70 (33.20)	40.11 (34.04)	45.79 (30.76)	34.63 (30.77)
N₅	47.52 (38.48)	31.46 (28.89)	39.03 (33.32)	38.93 (33.44)	41.01 (28.90)	31.85 (29.12)
N₆	46.88 (38.12)	34.04 (30.44)	38.67 (33.10)	42.68 (35.62)	34.80 (29.65)	34.39 (30.65)
N₇	36.16 (31.72)	41.58 (34.87)	41.93 (35.08)	44.58 (36.81)	48.80 (31.33)	36.13 (31.65)
N₈	46.06 (37.77)	40.21 (34.05)	37.84 (32.60)	43.81 (36.45)	47.68 (28.17)	40.12 (34.00)
N₉	47.50 (38.69)	39.79 (33.81)	43.07 (35.73)	48.23 (39.33)	52.61 (42.46)	39.77 (33.81)
N₁₀	45.61 (37.46)	40.53 (34.26)	33.15 (29.89)	45.92 (37.82)	49.86 (32.17)	40.45 (34.22)
N₁₁	39.28 (33.73)	40.76 (34.43)	37.13 (32.32)	44.25 (36.55)	49.38 (31.47)	41.68 (34.95)
N₁₂	40.88 (34.75)	40.78 (34.38)	35.96 (31.57)	48.12 (39.35)	48.88 (33.30)	40.75 (34.36)
SE_D	2.98	2.88	2.28	1.82	4.10	1.63
CD (p=0.05)	NS	NS	NS	NS	NS	NS
Interaction Effects						
M₁N₁	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₃	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₄	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₅	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₆	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₇	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₈	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₉	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₀	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₁	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₂N₁	49.62 (44.78)	48.24 (43.99)	50.73 (45.42)	53.67 (47.11)	45.88 (42.64)	48.86 (44.35)
M₂N₂	62.26 (52.09)	33.33 (35.26)	44.79 (42.01)	52.70 (46.55)	34.03 (35.69)	32.07 (34.49)
M₂N₃	65.84 (54.24)	33.79 (35.54)	48.72 (44.27)	46.54 (43.02)	40.62 (39.59)	35.29 (36.45)
M₂N₄	63.78 (53.00)	39.89 (39.17)	45.35 (42.33)	47.99 (43.85)	38.90 (38.59)	37.67 (37.86)
M₂N₅	65.17 (53.83)	34.65 (36.06)	50.50 (45.29)	41.36 (40.03)	30.81 (33.72)	34.54 (35.99)

M₂N₆	62.76 (52.39)	32.00 (34.45)	51.68 (45.96)	51.95 (46.12)	30.08 (33.26)	33.77 (35.53)
M₂N₇	37.86 (37.97)	52.88 (46.65)	53.46 (46.98)	54.77 (47.74)	30.30 (33.40)	42.26 (40.55)
M₂N₈	57.06 (49.06)	50.54 (45.31)	53.52 (47.02)	50.77 (45.44)	22.85 (28.56)	50.17 (45.10)
M₂N₉	59.89 (50.71)	49.36 (44.64)	57.02 (49.04)	58.78 (50.05)	53.16 (46.81)	48.73 (44.27)
M₂N₁₀	56.63 (48.81)	50.34 (45.20)	35.85 (36.78)	54.37 (47.50)	29.37 (32.82)	49.98 (44.99)
M₂N₁₁	39.6 (39.04)	49.41 (44.66)	38.48 (38.34)	55.67 (48.25)	29.24 (32.73)	51.98 (46.13)
M₂N₁₂	42.38 (40.62)	51.97 (46.13)	39.72 (39.07)	57.48 (49.30)	39.23 (38.78)	52.50 (46.43)
M₃N₁	70.34 (57.00)	72.22 (43.99)	75.24 (60.16)	66.82 (54.83)	78.08 (62.08)	72.28 (58.23)
M₃N₂	80.62 (63.89)	64.29 (35.26)	73.70 (59.15)	70.05 (56.82)	73.48 (59.01)	64.13 (53.21)
M₃N₃	80.43 (63.74)	58.24 (35.54)	72.39 (58.30)	71.43 (57.69)	74.93 (59.95)	60.70 (51.18)
M₃N₄	76.19 (60.79)	66.31 (39.17)	70.75 (57.26)	72.34 (58.27)	64.95 (53.70)	66.20 (54.46)
M₃N₅	77.40 (61.61)	59.72 (36.06)	66.58 (54.68)	75.43 (60.28)	63.73 (52.97)	61.00 (51.36)
M₃N₆	77.89 (61.95)	70.13 (34.45)	64.34 (53.33)	76.10 (60.73)	68.23 (55.69)	69.39 (56.41)
M₃N₇	70.62 (57.18)	71.87 (46.65)	72.34 (58.27)	78.97 (62.71)	75.87 (60.58)	66.13 (54.41)
M₃N₈	81.12 (64.25)	70.09 (45.31)	60.00 (50.77)	80.67 (63.92)	68.63 (55.94)	70.20 (56.91)
M₃N₉	82.62 (65.36)	70.00 (44.64)	72.18 (58.16)	85.90 (67.95)	97.32 (80.57)	70.57 (57.15)
M₃N₁₀	80.19 (63.57)	71.24 (45.20)	63.61 (52.90)	83.38 (65.94)	80.34 (63.68)	71.38 (57.66)
M₃N₁₁	78.16 (62.14)	72.89 (44.66)	72.90 (58.63)	77.08 (61.40)	77.49 (61.68)	73.06 (58.73)
M₃N₁₂	80.27 (63.63)	70.37 (46.13)	68.17 (55.65)	86.88 (68.76)	76.69 (61.13)	69.75 (56.63)
MXN						
SE_D	5.02	4.82	3.84	3.70	8.32	3.32
CD (p=0.05)	NS	NS	NS	NS	NS	NS
NXM						
SE_D	5.17	4.99	3.96	3.16	7.11	7.48
CD (p=0.05)	NS	NS	NS	NS	NS	NS

Table-7 Effect of *in situ* soil moisture conservation WCE (%) in maize @ 30 DAS (Dry weight basis)
Weed Control Efficiency 15 DAS (Dry weight basis)

Treatments	<i>Cynodan dactylon</i>	<i>Echinochloa colonum</i>	<i>Cyperus rotundus</i>	<i>Amaranthus sp.</i>	<i>Trianthema portulacastrum</i>	<i>Cleome viscosa</i>
In situ soil moisture conservation						
M_i	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M_e	30.33 (33.31)	43.54 (43.85)	56.23 (48.59)	34.01 (35.66)	18.25 (25.26)	61.40 (51.62)
M_b	92.12 (74.03)	76.62 (58.23)	71.63 (57.87)	63.48 (52.83)	46.73 (43.12)	75.60 (60.42)
SE_D	2.12	2.02	2.10	2.62	2.02	2.22
CD (p=0.05)	5.89	5.60	5.85	7.28	5.62	6.15
Nitrogen management						
N₁	40.21 (36.06)	41.51 (34.66)	39.91 (33.80)	33.07 (29.84)	20.65 (22.18)	45.57 (37.32)
N₂	39.45 (35.29)	41.77 (34.65)	42.55 (35.42)	34.12 (30.48)	22.06 (23.13)	44.10 (36.46)
N₃	38.93 (34.54)	39.29 (34.84)	39.38 (33.49)	34.57 (30.75)	21.94 (23.07)	44.36 (36.58)
N₄	36.73 (32.46)	41.19 (34.35)	42.00 (35.12)	31.21 (28.72)	22.46 (23.42)	44.75 (36.79)
N₅	36.72 (32.56)	41.81 (34.42)	41.48 (34.81)	32.58 (29.55)	23.88 (24.24)	45.35 (37.12)

N ₆	40.25 (35.12)	42.41 (33.91)	41.56 (34.87)	31.16 (28.70)	21.44 (22.58)	47.14 (38.16)
N ₇	40.19 (35.09)	43.11 (34.07)	41.43 (34.82)	31.97 (29.19)	21.48 (22.57)	46.26 (37.61)
N ₈	41.19 (35.75)	35.79 (33.41)	41.03 (34.57)	30.99 (28.57)	21.28 (22.53)	47.08 (38.17)
N ₉	42.26 (36.69)	37.95 (33.29)	43.56 (36.04)	32.98 (29.79)	21.79 (22.88)	45.28 (37.19)
N ₁₀	44.34 (38.25)	39.01 (32.91)	45.88 (37.46)	31.43 (28.89)	19.41 (21.52)	45.15 (37.05)
N ₁₁	43.87 (38.08)	38.43 (32.91)	46.41 (37.78)	34.34 (30.60)	21.19 (22.34)	45.97 (37.55)
N ₁₂	45.67 (39.51)	38.37 (34.89)	46.22 (37.68)	31.54 (28.92)	22.34 (23.07)	46.99 (38.15)
SE _D	1.81	1.73	1.80	2.25	1.74	1.89
CD (p=0.05)	NS	NS	NS	NS	NS	NS
Interaction Effects						
M ₁ N ₁	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₃	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₄	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₅	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₆	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₇	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₈	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₉	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₁₀	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₁₁	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₁ N ₁₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M ₂ N ₁	24.69 (29.80)	41.61 (46.25)	57.58 (49.36)	32.43 (34.72)	17.40 (24.65)	59.57 (50.52)
M ₂ N ₂	23.53 (29.02)	43.29 (46.76)	56.13 (48.52)	35.70 (36.69)	20.10 (26.63)	55.45 (48.13)
M ₂ N ₃	24.30 (29.54)	37.93 (47.71)	55.75 (48.30)	36.59 (37.22)	20.25 (26.75)	57.14 (49.11)
M ₂ N ₄	25.00 (30.00)	45.32 (46.72)	53.80 (47.18)	31.70 (34.27)	21.43 (27.58)	58.85 (50.09)
M ₂ N ₅	22.93 (28.61)	47.95 (45.20)	52.92 (46.67)	33.44 (35.33)	21.57 (27.67)	61.18 (51.46)
M ₂ N ₆	30.43 (33.48)	50.59 (43.84)	52.30 (46.32)	32.41 (34.70)	16.58 (24.03)	68.98 (56.15)
M ₂ N ₇	30.18 (33.32)	53.59 (43.72)	51.12 (45.64)	35.90 (36.81)	16.15 (23.70)	68.39 (55.79)
M ₂ N ₈	32.83 (34.96)	41.09 (41.70)	50.57 (45.32)	29.96 (33.19)	17.39 (24.65)	65.85 (54.24)
M ₂ N ₉	34.01 (35.67)	42.32 (40.93)	57.49 (49.31)	34.45 (35.94)	18.28 (25.31)	57.51 (49.32)
M ₂ N ₁₀	38.56 (38.39)	40.58 (39.69)	61.82 (51.83)	37.02 (37.48)	18.46 (25.44)	59.08 (50.23)
M ₂ N ₁₁	36.75 (37.32)	39.24 (38.86)	62.94 (52.50)	36.96 (37.44)	15.20 (22.95)	60.98 (51.34)
M ₂ N ₁₂	40.75 (39.67)	38.93 (44.79)	62.31 (52.13)	31.54 (34.17)	16.24 (23.77)	63.83 (53.03)
M ₃ N ₁	95.94 (78.38)	82.92 (57.73)	62.15 (52.03)	66.77 (54.80)	44.55 (41.87)	77.15 (61.44)
M ₃ N ₂	94.83 (76.86)	82.01 (57.17)	71.53 (57.75)	66.67 (54.74)	46.09 (42.76)	76.86 (61.25)
M ₃ N ₃	92.48 (74.09)	79.94 (56.82)	62.38 (52.17)	67.13 (55.02)	45.57 (42.46)	75.94 (60.63)
M ₃ N ₄	85.20 (67.38)	78.25 (56.33)	72.20 (58.18)	61.93 (51.90)	45.96 (42.68)	75.42 (60.28)
M ₃ N ₅	87.24 (69.07)	77.49 (58.07)	71.53 (57.75)	64.30 (53.31)	50.08 (45.04)	74.86 (59.91)
M ₃ N ₆	90.33 (71.89)	76.63 (57.88)	72.38 (58.30)	61.07 (51.40)	47.74 (43.70)	72.45 (58.34)
M ₃ N ₇	90.38 (71.93)	75.75 (58.50)	73.17 (58.81)	60.00 (50.77)	48.30 (44.03)	70.38 (57.03)

M₁N₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₃	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₄	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₅	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₆	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₇	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₈	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₉	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₀	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₁	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₁N₁₂	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
M₂N₁	43.65 (41.35)	41.61 (40.17)	58.55 (49.92)	36.74 (37.31)	41.44 (40.07)	33.63 (35.45)
M₂N₂	46.05 (42.73)	43.29 (41.15)	56.63 (48.81)	37.50 (37.76)	40.35 (39.43)	32.62 (34.83)
M₂N₃	50.00 (45.00)	37.93 (38.02)	55.49 (48.15)	38.61 (38.42)	38.58 (38.40)	34.47 (35.95)
M₂N₄	47.03 (43.30)	45.32 (42.31)	55.08 (47.91)	40.34 (39.43)	38.77 (38.51)	27.13 (31.39)
M₂N₅	50.35 (45.20)	47.95 (43.83)	54.76 (47.73)	41.73 (40.24)	38.74 (38.49)	26.28 (30.84)
M₂N₆	46.03 (42.72)	50.59 (45.34)	53.86 (47.21)	43.04 (41.00)	37.41 (37.71)	26.84 (31.21)
M₂N₇	46.35 (42.91)	53.59 (47.06)	46.37 (42.92)	44.30 (41.73)	39.59 (38.99)	32.05 (34.48)
M₂N₈	44.66 (41.93)	41.09 (39.86)	65.04 (53.75)	38.07 (38.10)	31.05 (33.86)	34.59 (36.03)
M₂N₉	45.84 (42.62)	42.32 (40.58)	65.71 (54.16)	40.16 (39.33)	39.26 (38.80)	35.26 (36.43)
M₂N₁₀	43.56 (41.30)	40.58 (39.57)	62.61 (52.30)	39.83 (39.13)	41.67 (40.20)	33.23 (35.20)
M₂N₁₁	43.73 (41.40)	39.24 (38.78)	60.59 (51.12)	40.65 (39.61)	44.27 (41.71)	34.30 (35.85)
M₂N₁₂	43.94 (41.52)	38.93 (38.60)	57.05 (49.05)	41.92 (40.35)	43.97 (41.54)	33.44 (35.33)
M₃N₁	71.59 (57.79)	82.92 (65.59)	78.59 (62.43)	62.87 (52.46)	79.18 (62.85)	66.37 (54.55)
M₃N₂	71.78 (57.91)	82.01 (64.91)	78.02 (62.04)	63.67 (52.93)	78.57 (62.43)	59.34 (50.38)
M₃N₃	71.21 (57.55)	79.94 (63.39)	74.65 (59.77)	63.13 (52.61)	79.72 (63.24)	54.04 (47.32)
M₃N₄	69.63 (56.56)	78.25 (62.20)	74.41 (59.61)	65.97 (54.31)	76.01 (60.67)	58.23 (49.74)
M₃N₅	66.04 (54.36)	77.49 (61.67)	74.95 (59.97)	68.98 (56.16)	75.00 (60.00)	60.12 (50.84)
M₃N₆	74.07 (59.39)	76.63 (61.09)	76.64 (61.10)	71.24 (57.57)	80.83 (64.03)	60.18 (50.87)
M₃N₇	74.35 (59.57)	75.75 (60.50)	74.07 (59.39)	70.77 (57.27)	77.16 (61.45)	58.01 (49.61)
M₃N₈	72.92 (58.64)	66.28 (54.50)	72.97 (58.67)	65.68 (54.14)	77.73 (61.84)	59.43 (50.44)
M₃N₉	74.56 (59.71)	71.54 (57.76)	80.29 (63.64)	65.86 (54.25)	78.53 (62.39)	60.26 (50.92)
M₃N₁₀	72.16 (58.16)	76.45 (60.97)	82.14 (65.00)	62.68 (52.35)	78.05 (62.06)	61.29 (51.53)
M₃N₁₁	72.27 (58.22)	76.04 (60.69)	84.75 (67.01)	61.08 (51.40)	77.87 (61.94)	64.14 (53.22)
M₃N₁₂	71.70 (57.86)	76.17 (60.78)	86.33 (68.30)	58.52 (49.90)	82.88 (65.55)	64.57 (53.47)
MXN						
SE_D	3.45	4.04	3.83	3.19	4.35	2.94
CD (p=0.05)	NS	NS	NS	NS	NS	NS
NXM						
SE_D	2.95	3.45	3.27	2.73	3.71	2.51
CD (p=0.05)	NS	NS	NS	NS	NS	NS

significant differences among the nutrient management and the interaction effect of nutrient management and insitu soil moisture conservation were observed on WCI.

Based on the results of present investigation, it can be concluded that adoption of insitu soil moisture conservation technique with water hyacinth mulch @ 12 t ha⁻¹ was found to be most effective method to suppress the weed growth and to achieve higher Weed control efficiency and Weed control index in maize.

References :

1. Adekalu, K.O., I.A. Olorunfemi, and J.A. Osunbitan, (2007). *Bioresource Technology*, 98: 912–917.
2. Agarwal, N., S.S. Agarwal, H.G. Sharma, P. Dubey and A. Dixit, (2002). *Orissa Journal of Horticulture*. 30(2): 80-84.
3. Amoroso G, P Frangi, R Piatti, A Fini and F. Ferrini (2010). *Horticulture technology* 20(6): 957-962.
4. Ali, K., F. Munsif, Z. Husain, I. Khan, N. Ahmad, and N. Khan, (2013). *Pakistan Journal of Weed Science Research*. 17(4): 1-9.
5. Asif, M., M A. Nadeem, A. Aziz, M E. Safdar, M. Adnan, and A. Ali, (2020). *International Journal of Botany Studies*. 5(2): 57-61.
6. Deveshpathak, Ved Prakash, Shubhranshu Singh and Vikas Yadav. (2021). *The Pharma Innovation Journal*. 10(8): 476-478.
7. Gomez, K. A. and A. A. Gomez, (2010). *Statistical Procedures for Agriculture Research*. (2nd ed), John Wiley and Sons, New York.
8. Kumar, V., S. Prasad, D. Kumar, J. Kumar, B. Shahi, and SK. Singh, (2018). *Bulletin of Environment Pharmacology and Life Sciences* 8(1): 162-167.
9. Sharma, JC. and G. Kathiravan, (2009). *Indian Journal of Horticulture*. 66(4): 465-471.
10. Sochinwechi Nwosisi, Dilip Nandwani and Dafeng Hui. (2019). *Agronomy* 9: 190.