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

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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) (M_1), hydrogel mulch (M_2) and water hyacinth mulch (M_3) 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} (M_3) significantly decreased the individual weed population with higher weed control efficiency when compared to unmulched control plot (M_1). 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 yield[5]. 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 soil[10] 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 fuana including human being and animals in a holistic manner[1].

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., M_1- Control, M_2-Hydrogel at 10 kg ha^{-1} and M_3- Water Hyacinth at 12 t ha^{-1}. In subplot, nutrient management practices were imposed such as N_1 – Control, N_2 - 100% RDN as Prilled Urea (PU), N_3 - 100% RDN as Nano Urea (NU), N_4 - 75% RDN as PU + 25% as NU, N_5 -50% RDN as PU + 50% RDN as NU, N_6 - 25% RDN as PU + 75% NU, N_7-125% RDN as PU, N_8-125% RDN as NU, N_9- 100% RDN as PU + 25% as NU, N_{10}-75% RDN as PU + 50% as NU, N_{11}-50% RDN as PU + 75% as NU and N_{12}-25% RDN as PU + 100% as NU. Nano urea were foliar sprayed at 20 and 40 DAS. Whereas, P_2O_5 and K_2O were supplied uniformly to all the treatmental plots through single super phosphate (P_2O_5) and muriate of potash (60% K_2O) 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 Gomez[7]. 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 and1.22), *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} (M_3) 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 (M_1) *viz.*, *Cynodon dactylon* (5.91and 3.95), *Echinochloa colonum* (4.86 and 3.98), *Cyperus rotundus* (7.01and 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 and1.17), *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} (M_3) 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 Kathiravan[9]. 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* (4.25and 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						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus* sp.	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_1	5.91 (2.53)	4.86 (2.31)	7.01 (2.74)	5.97 (2.54)	8.94 (3.07)	4.78 (2.30)
M_2	3.95 (2.11)	2.89 (1.84)	4.19 (2.17)	3.96 (2.11)	5.10 (2.36)	2.87 (1.83)
M_3	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						
N_1	3.86 (2.04)	2.79 (1.77)	4.63 (2.21)	4.03 (2.70)	6.84 (2.70)	2.78 (2.70)
N_2	4.21 (2.12)	3.16 (1.87)	4.60 (2.23)	4.03 (2.71)	6.95 (2.71)	3.08 (2.71)
N_3	4.09 (2.08)	3.14 (1.87)	4.55(2.20)	4.10 (2.66)	6.69 (2.66)	3.04 (2.66)
N_4	3.95 (2.07)	2.97 (1.82)	4.33 (2.15)	4.07 (2.54)	6.13 (2.54)	2.88 (2.54)
N_5	4.04 (2.06)	3.03 (1.84)	4.43 (2.18)	4.12 (2.61)	6.44 (2.61)	2.99 (2.61)
N_6	4.17 (2.11)	3.01 (1.82)	4.62 (2.23)	4.01 (2.67)	6.73 (2.67)	2.93 (2.67)
N_7	3.83 (2.06)	3.05 (1.84)	4.45 (2.21)	3.95 (2.42)	5.55 (2.42)	3.04 (2.42)
N_8	3.81 (2.06)	3.14 (1.87)	4.27 (2.13)	3.97 (2.51)	5.97 (2.51)	3.11 (2.51)
N_9	3.85 (2.07)	3.00 (1.83)	4.30 (2.15)	3.84 (2.42)	5.59 (2.42)	2.93 (2.42)
N_{10}	3.81(2.08)	2.91 (1.81)	4.31 (2.19)	3.87 (2.45)	5.71 (2.45)	2.93 (2.45)
N_{11}	3.91 (2.07)	2.91(1.80)	4.37 (2.20)	3.82 (2.45)	5.67 (2.45)	2.89 (2.45)
N_{12}	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						
M_1N_1	5.71 (2.49)	4.68 (2.28)	7.45 (2.82)	5.98 (2.55)	8.93 (3.07)	4.57 (2.25)
M_1N_2	6.33 (2.61)	5.24 (2.40)	7.23 (2.78)	5.87 (2.52)	9.32 (3.13)	5.10 (2.37)
M_1N_3	6.22 (2.59)	5.15 (2.38)	7.19 (2.77)	5.75 (2.50)	9.23 (3.12)	5.04 (2.35)
M_1N_4	6.02 (2.55)	4.97 (2.34)	7.06 (2.75)	5.66 (2.48)	9.09 (3.10)	4.86 (2.32)
M_1N_5	6.14 (2.58)	5.06 (2.36)	7.15 (2.77)	5.53 (2.46)	9.12 (3.11)	5.05 (2.36)
M_1N_6	6.39 (2.62)	5.28 (2.40)	7.28 (2.79)	6.07 (2.56)	8.95 (3.07)	5.17 (2.38)
M_1N_7	5.56 (2.46)	4.74 (2.29)	6.92 (2.72)	6.10 (2.57)	8.51 (3.00)	4.63 (2.26)

M_1N_8	5.51 (2.45)	4.83 (2.31)	7.01 (2.74)	6.23 (2.59)	9.03 (3.09)	4.72 (2.28)
M_1N_9	5.81 (2.51)	4.63 (2.26)	6.56 (2.66)	6.34 (2.62)	8.91 (3.07)	4.52 (2.24)
M_1N_{10}	5.72 (2.49)	4.52 (2.24)	6.65 (2.67)	6.42 (2.63)	8.85 (3.06)	4.55 (2.25)
M_1N_{11}	5.64 (2.48)	4.59 (2.26)	6.74 (2.69)	6.11 (2.57)	8.74 (3.04)	4.51 (2.24)
M_1N_{12}	5.89 (2.53)	4.65 (2.27)	6.83 (2.71)	5.61 (2.47)	8.63 (3.02)	4.58 (2.25)
M_2N_1	4.30 (2.19)	2.52 (1.74)	4.25 (2.18)	4.02 (2.13)	6.03 (2.56)	2.59 (1.76)
M_2N_2	4.44 (2.22)	2.92 (1.85)	4.36 (2.21)	4.12 (2.15)	5.90 (2.53)	2.82 (1.82)
M_2N_3	4.37 (2.21)	2.73 (1.80)	4.19 (2.16)	4.23 (2.17)	5.59 (2.47)	2.63 (1.77)
M_2N_4	3.99 (2.12)	2.66 (1.78)	3.82 (2.08)	4.33 (2.20)	5.00 (2.35)	2.55 (1.75)
M_2N_5	4.20 (2.17)	2.55 (1.75)	4.02 (2.13)	4.42 (2.22)	5.26 (2.40)	2.51 (1.74)
M_2N_6	4.26 (2.18)	2.60 (1.76)	4.41 (2.22)	3.98 (2.12)	5.90 (2.53)	2.53 (1.74)
M_2N_7	3.52 (2.01)	3.18 (1.92)	4.38 (2.21)	3.87 (2.09)	4.41 (2.22)	3.28 (1.94)
M_2N_8	3.62 (2.03)	3.28 (1.94)	3.76 (2.06)	3.92 (2.10)	4.85 (2.31)	3.30 (1.95)
M_2N_9	3.72 (2.05)	3.09 (1.89)	4.34 (2.20)	3.56 (2.01)	4.67 (2.27)	3.06 (1.89)
M_2N_{10}	3.64 (2.03)	3.03 (1.88)	4.31 (2.19)	3.64 (2.03)	4.58 (2.25)	3.08 (1.89)
M_2N_{11}	3.60 (2.02)	3.04 (1.88)	4.45 (2.22)	3.77 (2.07)	4.50 (2.24)	3.07 (1.89)
M_2N_{12}	3.74 (2.06)	3.10 (1.90)	4.03 (2.13)	3.63 (2.03)	4.48 (2.23)	3.02 (1.88)
M_3N_1	1.58 (1.44)	1.18 (1.30)	2.19 (1.64)	2.09 (1.61)	3.71 (2.05)	1.17 (1.29)
M_3N_2	1.85 (1.53)	1.33 (1.35)	2.21 (1.72)	2.11 (1.62)	3.83 (2.08)	1.30 (1.34)
M_3N_3	1.67 (1.44)	1.54 (1.43)	2.27 (1.66)	2.32 (1.68)	3.56 (2.01)	1.44 (1.39)
M_3N_4	1.85 (1.53)	1.27 (1.33)	2.11 (1.61)	2.21 (1.65)	3.06 (1.89)	1.23 (1.31)
M_3N_5	1.77 (1.43)	1.48 (1.41)	2.12 (1.64)	2.40 (1.70)	2.88 (1.84)	1.41 (1.38)
M_3N_6	1.85 (1.53)	1.15 (1.28)	2.16 (1.68)	1.98 (1.57)	3.18 (1.92)	1.11 (1.27)
M_3N_7	2.40 (1.70)	1.23 (1.31)	2.06 (1.71)	1.87 (1.54)	2.58 (1.76)	1.21 (1.31)
M_3N_8	2.31 (1.71)	1.31 (1.35)	2.04 (1.58)	1.76 (1.50)	2.86 (1.83)	1.30 (1.34)
M_3N_9	2.01 (1.65)	1.28 (1.33)	2.01 (1.60)	1.62 (1.46)	1.82 (1.52)	1.22 (1.31)
M_3N_{10}	2.07 (1.72)	1.19 (1.30)	1.95 (1.70)	1.55 (1.43)	2.09 (1.61)	1.17 (1.29)
M_3N_{11}	2.49 (1.72)	1.10 (1.26)	1.93 (1.67)	1.59 (1.45)	2.62 (1.77)	1.09 (1.26)
M_3N_{12}	2.10 (1.61)	1.26 (1.33)	1.91 (1.64)	1.51 (1.42)	2.28 (1.67)	1.26 (1.33)
M X N						
SE_D	0.24	0.21	0.28	0.11	0.22	0.09
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
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						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus* sp.	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_1	3.95 (2.11)	3.98 (2.12)	3.90 (2.10)	4.06 (2.14)	4.81 (2.30)	3.96 (2.11)
M_2	2.47 (1.72)	2.22 (1.65)	2.05 (1.59)	1.95 (1.56)	4.17 (1.89)	2.23 (1.65)
M_3	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						
N_1	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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_{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_1N_{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_1N_{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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_{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_2N_{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_2N_{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_3N_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_3N_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)
M_3N_3	1.22 (1.31)	1.52 (1.42)	1.19 (1.30)	1.24 (1.32)	1.13 (1.31)	1.32 (1.40)
M_3N_4	1.43 (1.39)	1.25 (1.32)	1.29 (1.34)	1.17 (1.29)	1.71 (1.28)	1.47 (1.31)
M_3N_5	1.39 (1.37)	1.43 (1.39)	1.33 (1.35)	1.01 (1.23)	1.73 (1.49)	1.22 (1.38)
M_3N_6	1.41 (1.38)	1.12 (1.27)	1.38 (1.37)	0.98 (1.22)	1.42 (1.49)	1.40 (1.29)
M_3N_7	1.07 (1.25)	1.20 (1.30)	1.04 (1.24)	0.86 (1.17)	1.17 (1.39)	1.16 (1.31)
M_3N_8	1.04 (1.24)	1.30 (1.34)	1.42 (1.39)	0.75 (1.12)	1.34 (1.29)	1.22 (1.35)
M_3N_9	1.01 (1.23)	1.25 (1.32)	1.01 (1.23)	0.53 (1.01)	0.15 (1.36)	1.31 (1.32)
M_3N_{10}	1.13 (1.28)	1.17 (1.29)	1.35 (1.36)	0.59 (1.04)	0.95 (0.81)	1.24 (1.30)
M_3N_{11}	1.23 (1.32)	1.12 (1.27)	1.00 (1.22)	0.91 (1.19)	1.09 (1.20)	1.19 (1.28)
M_3N_{12}	1.16 (1.29)	1.24 (1.32)	1.13 (1.28)	0.50 (1.00)	1.17 (1.26)	1.15 (1.33)
M X N						
SE_D	0.19	0.09	0.13	0.17	0.24	0.09
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
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 basis15 DAS						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus* sp.	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_1	5.94 (2.54)	4.25 (2.18)	7.26 (2.78)	6.01 (2.55)	6.02 (2.55)	4.96 (2.34)
M_2	4.13 (2.15)	2.20 (1.64)	3.17 (1.92)	3.97 (2.11)	4.91 (2.33)	1.92 (1.55)
M_3	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						
N_1	3.39 (1.84)	2.56 (1.50)	4.48 (2.18)	4.21 (2.13)	4.88 (2.31)	2.79 (1.76)
N_2	3.40 (1.85)	2.58 (1.51)	4.22 (2.11)	4.17 (2.12)	4.89 (2.31)	2.92 (1.79)
N_3	3.49 (1.89)	2.59 (1.52)	4.48 (2.19)	4.22 (2.13)	4.93 (2.32)	2.96 (1.80)
N_4	3.72 (1.97)	2.66 (1.53)	4.19 (2.11)	4.21 (2.14)	4.99 (2.33)	2.97 (1.81)
N_5	3.67 (1.95)	2.54 (1.54)	4.21 (2.11)	4.17 (2.13)	4.94 (2.31)	2.96 (1.80)
N_6	3.77 (1.96)	2.53 (1.53)	4.19 (2.11)	4.23 (2.14)	4.69 (2.26)	2.74 (1.74)
N_7	3.61 (1.92)	2.54 (1.51)	4.17 (2.10)	4.15 (2.13)	4.57 (2.24)	2.70 (1.74)
N_8	3.49 (1.89)	2.55 (1.45)	4.16 (2.10)	3.82 (2.05)	4.53 (2.23)	2.39 (1.65)
N_9	3.43 (1.87)	2.55 (1.44)	3.96 (2.05)	3.79 (2.04)	4.45 (2.21)	2.55 (1.69)
N_{10}	3.41 (1.85)	2.55 (1.45)	4.05 (2.06)	3.96 (2.09)	4.50(2.23)	2.51 (1.68)
N_{11}	3.39 (1.85)	2.53 (1.48)	3.98 (2.04	3.93 (2.07)	4.56 (2.23)	2.44 (1.66)
N_{12}	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						
M_1N_1	5.67 (2.48)	4.35 (2.20)	7.45 (2.82)	6.29 (2.61)	6.15 (2.58)	5.12 (2.37)
M_1N_2	5.61 (2.47)	4.39 (2.21)	7.34 (2.80)	6.33 (2.61)	6.27 (2.60)	5.23 (2.39)
M_1N_3	5.72 (2.49)	4.44 (2.22)	7.39 (2.81)	6.45 (2.64)	6.32 (2.61)	5.32 (2.41)
M_1N_4	5.88 (2.53)	4.49 (2.23)	7.23 (2.78)	6.12 (2.57)	6.44 (2.63)	5.37 (2.42)
M_1N_5	5.80 (2.51)	4.29 (2.19)	7.20 (2.77)	6.19 (2.590	6.49 (2.64)	5.41 (2.43)
M_1N_6	6.31 (2.61)	4.21 (2.17)	7.17 (2.77)	6.14 (2.58)	5.97 (2.54)	5.19 (2.39)
M_1N_7	6.03 (2.56)	4.25 (2.18)	7.12 (2.76)	6.10 (2.57)	5.82 (2.51)	5.03 (2.35)

M_1N_8	5.94 (2.54)	4.18 (2.16)	7.06 (2.75)	5.54 (2.46)	5.75 (2.50)	4.51 (2.24)
M_1N_9	5.94 (2.54)	4.17 (2.16)	7.01 (2.74)	5.66 (2.48)	5.69 (2.49)	4.66 (2.27)
M_1N_{10}	6.12 (2.57)	4.12 (2.15)	7.49 (2.83)	5.78 (2.51)	5.58 (2.47)	4.57 (2.25)
M_1N_{11}	6.04 (2.56)	4.09 (2.14)	7.42 (2.81)	5.98 (2.55)	5.79 (2.51)	4.51 (2.24)
M_1N_{12}	6.16 (2.58)	4.01 (2.12)	7.19 (2.77)	5.58 (2.47)	5.91 (2.53)	4.59 (2.26)
M_2N_1	4.27 (2.18)	2.08 (1.61)	3.16 (1.91)	4.25 (2.18)	5.08 (2.36)	2.07 (1.60)
M_2N_2	4.29 (2.19)	2.06 (1.60)	3.22 (1.93)	4.07 (2.14)	5.01 (2.35)	2.33 (1.68)
M_2N_3	4.33 (2.20)	2.01 (1.58)	3.27 (1.94)	4.09 (2.14)	5.04 (2.35)	2.28 (1.67)
M_2N_4	4.41 (2.22)	2.11 (1.62)	3.34 (1.96)	4.18 (2.16)	5.06 (2.36)	2.21 (1.65)
M_2N_5	4.47 (2.23)	2.13 (1.62)	3.39 (1.97)	4.12 (2.15)	5.09 (2.36)	2.10 (1.61)
M_2N_6	4.39 (2.21)	2.19 (1.64)	3.42 (1.98)	4.15 (2.16)	4.98 (2.34)	1.61 (1.45)
M_2N_7	4.21 (2.17)	2.22 (1.65)	3.48 (1.99)	3.91 (2.10)	4.88 (2.32)	1.59 (1.45)
M_2N_8	3.99 (2.12)	2.33 (1.68)	3.49 (2.00)	3.88 (2.09)	4.75 (2.29)	1.54 (1.43)
M_2N_9	3.92 (2.10)	2.38 (1.70)	2.98 (1.87)	3.71 (2.05)	4.65 (2.27)	1.98 (1.57)
M_2N_{10}	3.76 (2.06)	2.44 (1.71)	2.86 (1.83)	3.64 (2.03)	4.55 (2.25)	1.87 (1.54)
M_2N_{11}	3.82 (2.08)	2.48 (1.73)	2.75 (1.80)	3.77 (2.07)	4.91 (2.33)	1.76 (1.50)
M_2N_{12}	3.65 (2.04)	2.02 (1.59)	2.71 (1.79)	3.82 (2.08)	4.95 (2.33)	1.66 (1.47)
M_3N_1	0.2 (0.85)	1.24 (1.32)	2.82 (1.82)	2.09 (1.61)	3.41 (1.98)	1.17 (1.29)
M_3N_2	0.29 (0.89)	1.29 (1.34)	2.09 (1.61)	2.11 (1.62)	3.38 (1.97)	1.21 (1.31)
M_3N_3	0.43 (0.96)	1.33 (1.35)	2.78 (1.81)	2.12 (1.62)	3.44 (1.98)	1.28 (1.33)
M_3N_4	0.87 (1.17)	1.38 (1.37)	2.01 (1.58)	2.33 (1.68)	3.48 (1.99)	1.32 (1.35)
M_3N_5	0.74 (1.11)	1.20 (1.30)	2.05 (1.60)	2.21 (1.65)	3.24 (1.93)	1.36 (1.36)
M_3N_6	0.61 (1.05)	1.19 (1.30)	1.98 (1.57)	2.39 (1.70)	3.12 (1.90)	1.43 (1.39)
M_3N_7	0.58 (1.04)	1.16 (1.29)	1.91 (1.55)	2.44 (1.71)	3.01 (1.87)	1.49 (1.41)
M_3N_8	0.55 (1.02)	1.14 (1.28)	1.94 (1.56)	2.05 (1.60)	3.08 (1.89)	1.11 (1.27)
M_3N_9	0.43 (0.96)	1.11 (1.27)	1.88 (1.54)	2.01 (1.58)	3.01 (1.87)	1.01 (1.23)
M_3N_{10}	0.34 (0.92)	1.09 (1.26)	1.81 (1.52)	2.47 (1.72)	3.36 (1.96)	1.08 (1.26)
M_3N_{11}	0.31 (0.90)	1.03 (1.24)	1.76 (1.50)	2.03 (1.59)	2.99 (1.87)	1.04 (1.24)
M_3N_{12}	0.23 (0.85)	1.01 (1.23)	1.70 (1.48)	2.06 (1.60)	2.91 (1.85)	1.05 (1.24)
M X N						
SE_D	0.19	0.18	1.63	0.22	0.11	0.18
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
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						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus* sp.	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_1	4.16 (2.16)	3.08 (1.89)	4.92 (2.33)	5.05 (2.36)	5.07 (2.36)	3.22 (1.93)
M_2	2.25 (1.66)	1.73 (1.49)	2.08 (1.61)	3.02 (1.87)	3.06 (1.89)	2.19 (1.64)
M_3	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						
N_1	2.67 (1.74)	1.88 (1.50)	2.76 (1.75)	3.40 (1.95)	3.07 (1.83)	2.22 (1.63)
N_2	2.69 (1.75)	1.91 (1.51)	2.78 (1.75)	3.39 (1.94)	3.13 (1.85)	2.39 (1.68)
N_3	2.67 (1.74)	1.94 (1.52)	2.84 (1.78)	3.42 (1.95)	3.08 (1.83)	2.27 (1.65)
N_4	2.68 (1.75)	1.95 (1.53)	2.91 (1.80)	3.38 (1.94)	3.22 (1.88)	2.35 (1.67)
N_5	2.61 (1.73)	1.99 (1.54)	2.92 (1.80)	3.36 (1.93)	3.25 (1.89)	2.36 (1.67)
N_6	2.57 (1.71)	1.95 (1.53)	2.93 (1.80)	3.34 (1.92)	3.22 (1.87)	2.41 (1.69)
N_7	2.54 (1.70)	1.90 (1.51)	2.72 (1.75)	3.35 (1.92)	3.32 (1.90)	2.18 (1.62)
N_8	2.56 (1.71)	1.66 (1.45)	2.66 (1.72)	3.18 (1.89)	2.98 (1.81)	2.18 (1.62)
N_9	2.38 (1.66)	1.66 (1.44)	2.50 (1.67)	3.22 (1.90)	2.97 (1.81)	2.13 (1.60)
N_{10}	2.38 (1.66)	1.68 (1.45)	2.46 (1.66)	3.14 (1.88)	2.96 (1.81)	2.12 (1.60)
N_{11}	2.30 (1.64)	1.77 (1.48)	2.43 (1.64)	3.07 (1.86)	2.95 (1.80)	2.08 (1.58)
N_{12}	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						
M_1N_1	4.33 (2.20)	3.22 (1.93)	5.09 (2.36)	5.09 (2.36)	5.14 (2.37)	3.33 (1.96)
M_1N_2	4.43 (2.22)	3.28 (1.94)	5.05 (2.36)	5.12 (2.37)	5.18 (2.38)	3.44 (1.99)
M_1N_3	4.48 (2.23)	3.19 (1.92)	5.01 (2.35)	5.18 (2.38)	5.08 (2.36)	3.22 (1.93)
M_1N_4	4.38 (2.21)	3.31 (1.95)	5.12 (2.37)	5.23 (2.39)	5.21 (2.39)	3.28 (1.94)
M_1N_5	4.27 (2.18)	3.42 (1.98)	5.15 (2.38)	5.32 (2.41)	5.24 (2.40)	3.31 (1.95)
M_1N_6	4.28 (2.19)	3.38 (1.97)	5.18 (2.38)	5.39 (2.43)	5.32 (2.41)	3.39 (1.97)
M_1N_7	4.25 (2.18)	3.34 (1.96)	4.55 (2.25)	5.44 (2.44)	5.43 (2.44)	3.12 (1.90)
M_1N_8	4.21 (2.17)	2.58 (1.75)	4.92 (2.33)	4.86 (2.32)	4.67 (2.27)	3.18 (1.92)

M_1N_9	3.97 (2.11)	2.67 (1.78)	4.87 (2.32)	4.98 (2.34)	4.89 (2.32)	3.12 (1.90)
M_1N_{10}	3.88 (2.09)	2.76 (1.81)	4.76 (2.29)	4.77 (2.30)	4.92 (2.33)	3.10 (1.90)
M_1N_{11}	3.75 (2.06)	2.88 (1.84)	4.72 (2.28)	4.65 (2.27)	4.97 (2.34)	3.09 (1.89)
M_1N_{12}	3.71 (2.05)	2.98 (1.87)	4.61 (2.26)	4.58 (2.25)	4.73 (2.29)	3.02 (1.88)
M_2N_1	2.44 (1.71)	1.88 (1.54)	2.11 (1.62)	3.22 (1.93)	3.01 (1.87)	2.21 (1.65)
M_2N_2	2.39 (1.70)	1.86 (1.54)	2.19 (1.64)	3.20 (1.92)	3.09 (1.89)	2.32 (1.68)
M_2N_3	2.24 (1.66)	1.98 (1.57)	2.23 (1.65)	3.18 (1.92)	3.12 (1.90)	2.11 (1.62)
M_2N_4	2.32 (1.68)	1.81 (1.52)	2.30 (1.67)	3.12 (1.90)	3.19 (1.92)	2.39 (1.70)
M_2N_5	2.12 (1.62)	1.78 (1.51)	2.33 (1.68)	3.10 (1.90)	3.21 (1.93)	2.44 (1.71)
M_2N_6	2.31 (1.68)	1.67 (1.47)	2.39 (1.70)	3.07 (1.89)	3.33 (1.96)	2.41 (1.73)
M_2N_7	2.28 (1.67)	1.55 (1.43)	2.44 (1.71)	3.03 (1.88)	3.28 (1.94)	2.12 (1.62)
M_2N_8	2.33 (1.68)	1.52 (1.42)	1.72 (1.49)	3.01 (1.87)	3.22 (1.93)	2.08 (1.61)
M_2N_9	2.15 (1.63)	1.54 (1.43)	1.67 (1.47)	2.98 (1.87)	2.97 (1.86)	2.02 (1.59)
M_2N_{10}	2.19 (1.64)	1.64 (1.46)	1.78 (1.51)	2.87 (1.84)	2.87 (1.84)	2.07 (1.60)
M_2N_{11}	2.11 (1.62)	1.75 (1.50)	1.86 (1.54)	2.76 (1.81)	2.77 (1.81)	2.03 (1.59)
M_2N_{12}	2.08 (1.61)	1.82 (1.52)	1.98 (1.57)	2.66 (1.78)	2.65 (1.77)	2.01 (1.58)
M_3N_1	1.23 (1.32)	0.55 (1.02)	1.09 (1.26)	1.89 (1.55)	1.07 (1.25)	1.12 (1.27)
M_3N_2	1.25 (1.32)	0.59 (1.04)	1.11 (1.27)	1.86 (1.54)	1.11 (1.27)	1.40 (1.38)
M_3N_3	1.29 (1.34)	0.64 (1.07)	1.27 (1.33)	1.91 (1.55)	1.03 (1.24)	1.48 (1.41)
M_3N_4	1.33 (1.35)	0.72 (1.10)	1.31 (1.35)	1.78 (1.51)	1.25 (1.32)	1.37 (1.37)
M_3N_5	1.45 (1.40)	0.77 (1.13)	1.29 (1.34)	1.65 (1.47)	1.31 (1.35)	1.32 (1.35)
M_3N_6	1.11 (1.27)	0.79 (1.14)	1.21(1.31)	1.55 (1.43)	1.02 (1.23)	1.35 (1.36)
M_3N_7	1.09 (1.26)	0.81 (1.14)	1.18 (1.30)	1.59 (1.45)	1.24 (1.32)	1.31 (1.35)
M_3N_8	1.14 (1.28)	0.87 (1.17)	1.33 (1.35)	1.67 (1.47)	1.04 (1.24)	1.29 (1.34)
M_3N_9	1.01 (1.23)	0.76 (1.12)	0.96 (1.21)	1.70 (1.48)	1.05 (1.24)	1.24 (1.32)
M_3N_{10}	1.08 (1.26)	0.65 (1.07)	0.85 (1.16)	1.78 (1.51)	1.08 (1.26)	1.20 (1.30)
M_3N_{11}	1.04 (1.24)	0.69 (1.09)	0.72 (1.10)	1.81 (1.52)	1.10 (1.26)	1.11 (1.27)
M_3N_{12}	1.05 (1.24)	0.71 (1.10)	0.63 (1.06)	1.90 (1.55)	0.81 (1.14)	1.07 (1.25)
M X N						
SE_D	0.18	0.13	0.18	0.20	0.18	0.17
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
SE_D	0.15	0.11	0.15	0.17	0.15	0.14
CD (p=0.05)	NS	NS	NS	NS	NS	NS

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

Weed Control Efficiency 15 DAS						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus* sp.	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_1	0.00	0.00	0.00	0.00	0.00	0.00
M_2	33.26 (35.19)	40.24 (39.31)	40.03 (39.23)	35.26 (36.35)	43.08 (40.99)	39.58 (38.90)
M_3	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						
N_1	32.32 (29.34)	40.33 (34.23)	37.86 (2.70)	32.61 (2.70)	23.40 (28.20)	39.23 (2.70)
N_2	33.55 (30.13)	39.64 (33.83)	36.34 (2.71)	31.29 (2.71)	25.43 (29.14)	39.89 (2.71)
N_3	34.32 (30.62)	39.03 (33.38)	36.73 (2.66)	28.70 (2.66)	27.48 (30.17)	39.75 (2.66)
N_4	34.33 (30.61)	40.31 (34.21)	38.60 (2.54)	28.15 (2.54)	32.62 (32.21)	40.74 (2.54)
N_5	34.27 (30.59)	40.11 (34.00)	38.04 (2.61)	32.63 (2.61)	29.34 (32.12)	40.78 (2.61)
N_6	34.79 (30.90)	43.02 (35.89)	36.56 (2.67)	33.94 (2.67)	24.78 (29.72)	43.23 (2.67)
N_7	31.16 (28.73)	35.71 (31.50)	35.66 (2.42)	35.30 (2.42)	34.77 (33.50)	34.40 (2.42)
N_8	30.82 (28.51)	35.00 (31.04)	39.09 (2.51)	36.28 (2.51)	33.93 (32.88)	34.19 (2.51)
N_9	33.78 (30.27)	35.23 (31.18)	34.42 (2.42)	39.43 (2.42)	37.22 (35.58)	35.08 (2.42)
N_{10}	33.41 (30.05)	35.56 (31.40)	35.26 (2.45)	39.72 (2.45)	35.47 (34.97)	35.52 (2.45)
N_{11}	30.67 (28.44)	36.59 (32.07)	35.13 (2.45)	37.42 (2.45)	35.17 (33.66)	35.91 (2.45)
N_{12}	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						
M_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_{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_1N_{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_1N_{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_2N_1	24.66 (29.77)	46.17 (42.80)	42.92 (40.93)	32.78 (34.92)	32.47 (34.74)	43.24 (41.11)
M_2N_2	29.92 (33.16)	44.32 (41.74)	39.63 (39.02)	29.81 (33.09)	36.73 (37.30)	45.08 (42.18)
M_2N_3	29.76 (33.06)	47.04 (43.30)	41.77 (40.26)	26.43 (30.94)	39.40 (38.88)	47.87 (43.78)
M_2N_4	33.74 (35.51)	46.45 (42.96)	45.92 (42.66)	23.50 (29.00)	44.96 (42.11)	47.50 (43.57)
M_2N_5	31.68 (34.25)	49.59 (44.77)	43.77 (41.42)	41.81 (40.29)	42.34 (40.59)	50.28 (45.16)
M_2N_6	33.28 (35.23)	50.81 (45.46)	39.37 (38.86)	34.43 (35.93)	34.12 (35.74)	51.11 (45.64)
M_2N_7	36.64 (37.25)	33.01 (35.07)	36.69 (37.28)	36.56 (37.20)	48.13 (43.93)	29.26 (32.74)
M_2N_8	34.37 (35.89)	32.15 (34.54)	46.37 (42.92)	37.08 (37.51)	46.32 (42.89)	30.15 (33.30)
M_2N_9	36.01 (36.87)	33.34 (35.27)	33.86 (35.58)	43.85 (41.47)	47.60 (43.62)	32.26 (34.61)
M_2N_{10}	36.43 (37.13)	33.01 (35.07)	35.14 (36.36)	43.30 (41.15)	48.26 (44.00)	32.29 (34.63)
M_2N_{11}	36.22 (37.00)	33.68 (35.48)	33.98 (35.65)	38.30 (38.23)	48.52 (44.15)	31.84 (34.35)
M_2N_{12}	36.43 (37.13)	33.34 (35.27)	40.95 (39.79)	35.29 (36.45)	48.13 (43.93)	34.07 (35.71)
M_3N_1	72.30 (58.24)	74.83 (59.88)	70.65 (57.20)	65.05 (53.76)	58.44 (49.86)	74.44 (59.63)
M_3N_2	70.72 (57.24)	74.61 (59.74)	69.38 (56.40)	64.05 (53.16)	58.88 (50.12)	74.58 (59.73)
M_3N_3	73.19 (58.82)	70.06 (56.83)	68.42 (55.81)	59.65 (50.57)	61.45 (51.62)	71.39 (57.66)
M_3N_4	69.24 (56.32)	74.49 (59.66)	70.14 (56.88)	60.95 (51.33)	66.31 (54.52)	74.73 (59.82)
M_3N_5	71.15 (57.51)	70.73 (57.24)	70.35 (57.01)	56.09 (48.50)	68.37 (55.78)	72.05 (58.09)
M_3N_6	71.08 (57.47)	78.27 (62.21)	70.32 (56.99)	67.38 (55.17)	64.47 (53.41)	78.58 (62.43)
M_3N_7	56.83 (48.93)	74.14 (59.43)	70.28 (56.97)	69.34 (56.38)	69.65 (56.57)	73.96 (59.31)
M_3N_8	58.08 (49.65)	72.84 (58.59)	70.90 (57.35)	71.75 (57.89)	68.31 (55.74)	72.41 (58.32)
M_3N_9	65.34 (53.93)	72.33 (58.26)	69.41 (56.42)	74.45 (59.64)	79.57 (63.13)	72.99 (58.68)
M_3N_{10}	63.81 (53.02)	73.66 (59.12)	70.63 (57.18)	75.86 (60.57)	76.35 (60.90)	74.27 (59.52
M_3N_{11}	55.81 (48.33)	76.10 (60.73)	71.40 (57.67)	73.98 (59.33)	70.05 (56.82)	75.89 (60.59)
M_3N_{12}	64.35 (53.34)	72.91(58.64)	72.04 (58.07)	73.08 (58.75)	73.61 (59.09)	72.50 (58.37)
M X N						
SE_D	3.45	3.79	3.30	4.73	6.64	4.21
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
SE_D	3.55	3.90	2.82	4.03	5.67	3.60
CD (p=0.05)	NS	NS	NS	NS	NS	NS

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

Weed Control Efficiency 30 DAS						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus* sp.	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_1	0.00	0.00	0.00	0.00	0.00	0.00
M_2	55.24 (48.05)	43.87 (41.42)	47.49 (43.54)	52.17 (46.25)	53.45 (36.38)	43.15 (41.01)
M_3	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						
N_1	39.99 (33.93)	40.16 (34.06)	41.99 (35.19)	40.16 (33.98)	26.20 (34.91)	40.38 (34.19)
N_2	47.63 (38.66)	32.54 (29.52)	39.49 (33.72)	40.92 (34.46)	37.11 (31.56)	32.07 (29.23)
N_3	48.76 (39.33)	30.68 (28.43)	40.37 (34.19)	39.32 (33.57)	38.44 (33.18)	32.00 (29.21)
N_4	46.66 (37.93)	35.40 (31.23)	38.70 (33.20)	40.11 (34.04)	45.79 (30.76)	34.63 (30.77)
N_5	47.52 (38.48)	31.46 (28.89)	39.03 (33.32)	38.93 (33.44)	41.01 (28.90)	31.85 (29.12)
N_6	46.88 (38.12)	34.04 (30.44)	38.67 (33.10)	42.68 (35.62)	34.80 (29.65)	34.39 (30.65)
N_7	36.16 (31.72)	41.58 (34.87)	41.93 (35.08)	44.58 (36.81)	48.80 (31.33)	36.13 (31.65)
N_8	46.06 (37.77)	40.21 (34.05)	37.84 (32.60)	43.81 (36.45)	47.68 (28.17)	40.12 (34.00)
N_9	47.50 (38.69)	39.79 (33.81)	43.07 (35.73)	48.23 (39.33)	52.61 (42.46)	39.77 (33.81)
N_{10}	45.61 (37.46)	40.53 (34.26)	33.15 (29.89)	45.92 (37.82)	49.86 (32.17)	40.45 (34.22)
N_{11}	39.28 (33.73)	40.76 (34.43)	37.13 (32.32)	44.25 (36.55)	49.38 (31.47)	41.68 (34.95)
N_{12}	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						
M_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_{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_1N_{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_1N_{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_2N_1	49.62 (44.78)	48.24 (43.99)	50.73 (45.42)	53.67 (47.11)	45.88 (42.64)	48.86 (44.35)
M_2N_2	62.26 (52.09)	33.33 (35.26)	44.79 (42.01)	52.70 (46.55)	34.03 (35.69)	32.07 (34.49)
M_2N_3	65.84 (54.24)	33.79 (35.54)	48.72 (44.27)	46.54 (43.02)	40.62 (39.59)	35.29 (36.45)
M_2N_4	63.78 (53.00)	39.89 (39.17)	45.35 (42.33)	47.99 (43.85)	38.90 (38.59)	37.67 (37.86)
M_2N_5	65.17 (53.83)	34.65 (36.06)	50.50 (45.29)	41.36 (40.03)	30.81 (33.72)	34.54 (35.99)
M_2N_6	62.76 (52.39)	32.00 (34.45)	51.68 (45.96)	51.95 (46.12)	30.08 (33.26)	33.77 (35.53)
M_2N_7	37.86 (37.97)	52.88 (46.65)	53.46 (46.98)	54.77 (47.74)	30.30 (33.40)	42.26 (40.55)
M_2N_8	57.06 (49.06)	50.54 (45.31)	53.52 (47.02)	50.77 (45.44)	22.85 (28.56)	50.17 (45.10)
M_2N_9	59.89 (50.71)	49.36 (44.64)	57.02 (49.04)	58.78 (50.05)	53.16 (46.81)	48.73 (44.27)
M_2N_{10}	56.63 (48.81)	50.34 (45.20)	35.85 (36.78)	54.37 (47.50)	29.37 (32.82)	49.98 (44.99)
M_2N_{11}	39.6 (39.04)	49.41 (44.66)	38.48 (38.34)	55.67 (48.25)	29.24 (32.73)	51.98 (46.13)
M_2N_{12}	42.38 (40.62)	51.97 (46.13)	39.72 (39.07)	57.48 (49.30)	39.23 (38.78)	52.50 (46.43)
M_3N_1	70.34 (57.00)	72.22 (43.99)	75.24 (60.16)	66.82 (54.83)	78.08 (62.08)	72.28(58.23)
M_3N_2	80.62 (63.89)	64.29 (35.26)	73.70 (59.15)	70.05 (56.82)	73.48 (59.01)	64.13 (53.21)
M_3N_3	80.43 (63.74)	58.24 (35.54)	72.39 (58.30)	71.43 (57.69)	74.93 (59.95)	60.70 (51.18)
M_3N_4	76.19 (60.79)	66.31 (39.17)	70.75 (57.26)	72.34 (58.27)	64.95 (53.70)	66.20 (54.46)
M_3N_5	77.40 (61.61)	59.72 (36.06)	66.58 (54.68)	75.43 (60.28)	63.73 (52.97)	61.00 (51.36)
M_3N_6	77.89 (61.95)	70.13 (34.45)	64.34 (53.33)	76.10 (60.73)	68.23 (55.69)	69.39 (56.41)
M_3N_7	70.62 (57.18)	71.87 (46.65)	72.34 (58.27)	78.97 (62.71)	75.87 (60.58)	66.13 (54.41)
M_3N_8	81.12 (64.25)	70.09 (45.31)	60.00 (50.77)	80.67 (63.92)	68.63 (55.94)	70.20(56.91)
M_3N_9	82.62 (65.36)	70.00 (44.64)	72.18 (58.16)	85.90 (67.95)	97.32 (80.57)	70.57 (57.15)
M_3N_{10}	80.19 (63.57)	71.24 (45.20)	63.61 (52.90)	83.38 (65.94)	80.34 (63.68)	71.38 (57.66)
M_3N_{11}	78.16 (62.14)	72.89 (44.66)	72.90 (58.63)	77.08 (61.40)	77.49 (61.68)	73.06 (58.73)
M_3N_{12}	80.27 (63.63)	70.37 (46.13)	68.17 (55.65)	86.88 (68.76)	76.69 (61.13)	69.75 (56.63)
M X N						
SE_D	5.02	4.82	3.84	3.70	8.32	3.32
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
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)						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus* sp.	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_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_2	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_3	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						
N_1	40.21 (36.06)	41.51 (34.66)	39.91 (33.80)	33.07 (29.84)	20.65 (22.18)	45.57 (37.32)
N_2	39.45 (35.29)	41.77 (34.65)	42.55 (35.42)	34.12 (30.48)	22.06 (23.13)	44.10 (36.46)
N_3	38.93 (34.54)	39.29 (34.84)	39.38 (33.49)	34.57 (30.75)	21.94 (23.07)	44.36 (36.58)
N_4	36.73 (32.46)	41.19 (34.35)	42.00 (35.12)	31.21 (28.72)	22.46 (23.42)	44.75 (36.79)
N_5	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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_{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_1N_{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_1N_{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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_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_2N_{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_2N_{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_2N_{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_3N_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_3N_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_3N_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_3N_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_3N_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_3N_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_3N_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)
M_3N_8	90.74 (72.28)	66.28 (58.52)	72.52 (58.39)	63.00 (52.53)	46.43 (42.96)	75.39 (60.26)
M_3N_9	92.76 (74.39)	71.54 (58.94)	73.18 (58.81)	64.49 (53.42)	47.10 (43.34)	78.33 (62.25)
M_3N_{10}	94.44 (76.37)	76.45 (59.05)	75.83 (60.56)	57.27 (49.18)	39.78 (39.11)	76.37 (60.91)
M_3N_{11}	94.87 (76.91)	76.04 (59.88)	76.28 (60.85)	66.05 (54.36)	48.36 (44.06)	76.94 (61.30)
M_3N_{12}	96.27 (78.86)	76.17 (59.88)	76.36 (60.91)	63.08 (52.58)	50.76 (45.44)	77.12 (61.43)
M X N						
SE_D	3.69	3.51	3.66	4.56	3.52	3.84
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
SE_D	3.14	2.99	3.12	3.89	3.01	3.28
CD (p=0.05)	NS	NS	NS	NS	NS	NS

Table-8. Effect of *in situ* soil moisture conservation WCE (%) in maize @ 30 DAS (Dry weight basis)

Weed Control Efficiency 30 DAS (Dry weight basis)						
Treat-ments	*Cynodan dactylon*	*Echinocloa colonum*	*Cyperus rotundus*	*Amar-anthus*	*Trianthema portula-castrum*	*Cleome viscosa*
Insitu soil moisture conservation						
M_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_2	45.93 (42.66)	43.54 (41.27)	57.64 (49.42)	40.24 (39.37)	39.59 (38.98)	31.99 (34.42)
M_3	71.86 (57.98)	76.62 (61.17)	78.15 (62.25)	65.04 (53.78)	78.46 (62.37)	60.50 (51.07)
SE_D	1.99	2.33	2.20	1.84	2.50	1.69
CD (p=0.05)	5.52	6.47	6.13	5.11	6.95	4.69
Nitrogen management						
N_1	38.41 (33.05)	41.51 (35.25)	45.71 (37.45)	33.20 (29.92)	40.21 (34.31)	33.33 (30.00)
N_2	39.28 (33.55)	41.77 (35.35)	44.88 (36.95)	33.72 (30.23)	39.64 (33.95)	30.65 (28.40)
N_3	40.40 (34.18)	39.29 (33.80)	43.38 (35.97)	33.91 (30.34)	39.44 (33.88)	29.50 (27.76)
N_4	38.89 (33.29)	41.19 (34.84)	43.16 (35.84)	35.44 (31.25)	38.26 (33.06)	28.46 (27.04)
N_5	38.80 (33.19)	41.81 (35.17)	43.24 (35.90)	36.90 (32.13)	37.91 (32.83)	28.80 (27.23)
N_6	40.03 (34.04)	42.41 (35.48)	43.50 (36.10)	38.10 (32.86)	39.41 (33.91)	29.01 (27.36)
N_7	40.24 (34.16)	43.11 (35.85)	40.15 (34.10)	38.36 (33.00)	38.92 (33.48)	30.02 (28.03)
N_8	39.19 (33.53)	35.79 (31.46)	46.00 (37.48)	34.58 (30.74)	36.26 (31.90)	31.34 (28.82)
N_9	40.13 (34.11)	37.95 (32.78)	48.67 (39.27)	35.34 (31.19)	39.26 (33.73)	31.84 (29.11)
N_{10}	38.57 (33.15)	39.01 (33.51)	48.25 (39.10)	34.17 (30.49)	39.91 (34.09)	31.51 (28.91)
N_{11}	38.67 (33.21)	38.43 (33.16)	48.45 (39.38)	33.91 (30.34)	40.71 (34.55)	32.82 (29.69)
N_{12}	38.54 (33.13)	38.37 (33.13)	47.79 (39.12)	33.48 (30.08)	42.28 (35.70)	32.67 (29.60)
SE_D	1.70	1.99	1.89	1.58	2.15	1.44
CD (p=0.05)	NS	NS	NS	NS	NS	NS
Interaction Effects						
M_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_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_1N_{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_1N_{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_1N_{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_2N_1	43.65 (41.35)	41.61 (40.17)	58.55 (49.92)	36.74 (37.31)	41.44 (40.07)	33.63 (35.45)
M_2N_2	46.05 (42.73)	43.29 (41.15)	56.63 (48.81)	37.50 (37.76)	40.35 (39.43)	32.62 (34.83)
M_2N_3	50.00 (45.00)	37.93 (38.02)	55.49 (48.15)	38.61 (38.42)	38.58 (38.40)	34.47 (35.95)
M_2N_4	47.03 (43.30)	45.32 (42.31)	55.08 (47.91)	40.34 (39.43)	38.77 (38.51)	27.13 (31.39)
M_2N_5	50.35 (45.20)	47.95 (43.83)	54.76 (47.73)	41.73 (40.24)	38.74 (38.49)	26.28 (30.84)
M_2N_6	46.03 (42.72)	50.59 (45.34)	53.86 (47.21)	43.04 (41.00)	37.41 (37.71)	26.84 (31.21)
M_2N_7	46.35 (42.91)	53.59 (47.06)	46.37 (42.92)	44.30 (41.73)	39.59 (38.99)	32.05 (34.48)
M_2N_8	44.66 (41.93)	41.09 (39.86)	65.04 (53.75)	38.07 (38.10)	31.05 (33.86)	34.59 (36.03)
M_2N_9	45.84 (42.62)	42.32 (40.58)	65.71 (54.16)	40.16 (39.33)	39.26 (38.80)	35.26 (36.43)
M_2N_{10}	43.56 (41.30)	40.58 (39.57)	62.61 (52.30)	39.83 (39.13)	41.67 (40.20)	33.23 (35.20)
M_2N_{11}	43.73 (41.40)	39.24 (38.78)	60.59 (51.12)	40.65 (39.61)	44.27 (41.71)	34.30 (35.85)
M_2N_{12}	43.94 (41.52)	38.93 (38.60)	57.05 (49.05)	41.92 (40.35)	43.97 (41.54)	33.44 (35.33)
M_3N_1	71.59 (57.79)	82.92 (65.59)	78.59 (62.43)	62.87 (52.46)	79.18 (62.85)	66.37 (54.55)
M_3N_2	71.78 (57.91)	82.01 (64.91)	78.02 (62.04)	63.67 (52.93)	78.57 (62.43)	59.34 (50.38)
M_3N_3	71.21 (57.55)	79.94 (63.39)	74.65 (59.77)	63.13 (52.61)	79.72 (63.24)	54.04 (47.32)
M_3N_4	69.63 (56.56)	78.25 (62.20)	74.41 (59.61)	65.97 (54.31)	76.01 (60.67)	58.23 (49.74)
M_3N_5	66.04 (54.36)	77.49 (61.67)	74.95 (59.97)	68.98 (56.16)	75.00 (60.00)	60.12 (50.84)
M_3N_6	74.07 (59.39)	76.63 (61.09)	76.64 (61.10)	71.24 (57.57)	80.83 (64.03)	60.18 (50.87)
M_3N_7	74.35 (59.57)	75.75 (60.50)	74.07 (59.39)	70.77 (57.27)	77.16 (61.45)	58.01 (49.61)
M_3N_8	72.92 (58.64)	66.28 (54.50)	72.97 (58.67)	65.68 (54.14)	77.73 (61.84)	59.43 (50.44)
M_3N_9	74.56 (59.71)	71.54 (57.76)	80.29 (63.64)	65.86 (54.25)	78.53 (62.39)	60.26 (50.92)
M_3N_{10}	72.16 (58.16)	76.45 (60.97)	82.14 (65.00)	62.68 (52.35)	78.05 (62.06)	61.29 (51.53)
M_3N_{11}	72.27 (58.22)	76.04 (60.69)	84.75 (67.01)	61.08 (51.40))	77.87 (61.94)	64.14 (53.22)
M_3N_{12}	71.70 (57.86)	76.17 (60.78)	86.33 (68.30)	58.52 (49.90)	82.88 (65.55)	64.57 (53.47)
M X N						
SE_D	3.45	4.04	3.83	3.19	4.35	2.94
CD (p=0.05)	NS	NS	NS	NS	NS	NS
N X M						
SE_D	2.95	3.45	3.27	2.73	3.71	2.51
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 insitu soil moisture conservation practices with water hyacinth mulch @ 12 t ha^{-1} (M_3) 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 recorded in unmulched control plot (M_1). 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 insitu 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} (M_3). 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 (M_1). There is no 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 *in situ* 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.

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