Supplementary Table 1. Analysis of variance (ANOVA) for seed treatments, concentration of Zn-source and Treatment×concentration for vegetative, yield attributing and quality parameters of fodder maize crop (variety J-1006) grown under field conditions

Source	DF	Plant height (cm)	Leaf number	No. of internodes	Total stover yield	Mean fresh shoot weight	Mean fresh root weight	NDF	ADF	Hemicellulose	Cellulose
Trt	1	32.033^{ns}	2.133^{ns}	1.200^{ns}	0.042^{ns}	0.0385^{ns}	18900.300***	24.843*	29.403**	80.688**	13.333*
Trt×Rep	3	104.433^{ns}	0.033^{ns}	0.300^{ns}	0.153^{ns}	0.195^{ns}	776.100^{ns}	1.525^{ns}	0.217^{ns}	2.191^{ns}	0.036^{ns}
Conc	4	63.033**	22.700***	6.200***	9.937**	0.891**	43465.966***	56.321***	38.287**	36.092**	9.355**
Trt×Conc	4	1452.166^{ns}	2.800*	0.866^{ns}	1.692^{ns}	0.171^{ns}	11375.633***	3.426**	6.955*	10.314**	18.837**

*= $p \leq 0.05$, **= $p \leq 0.01$, ***=$p \leq 0.001$, ns= not significant

Supplementary Table 2. Interaction effect of seed treatments and concentration of Zn-source on vegetative, yield attributing and quality parameters of fodder maize crop (variety J-1006) grown under field conditions

Seed treatment	Zn source Concentration	Leaf number	Mean fresh root weight	NDF	ADF	Hemicellulose	Cellulose
Priming	**0**	6.666±0.57	170.333±18.17	58.766±0.57	35.866±1.50	22.900±1.93	27.066±2.17
	$ZnSO_4$ 20	9.666±1.52	210.00±10.00	60.833±0.40	38.833±0.90	22.000±1.10	29.500±0.65
	$ZnSO_4$ 40	11.666±0.57	249.000±3.60	62.733±0.50	35.866±0.45	26.566±0.73	28.733±1.27
	ZnONPs 20	12.000±0.0	483.333±28.86	66.866±1.0	40.300±1.80	26.766±1.16	30.533±0.87
	ZnONPs 40	12.666±0.57	340.666±13.65	62.900±0.96	40.233±1.85	22.666±1.07	29.166±0.51
Coating	**0**	8.333±1.52	317.666±15.04	55.833±1.05	39.866±1.72	15.966±1.81	30.533±1.87
	$ZnSO_4$ 20	12.000±1.0	283.333±28.86	58.766±0.97	38.066±1.36	21.566±1.55	32.033±1.25
	$ZnSO_4$ 40	11.000±1.0	311.666±63.31	61.366±1.53	36.500±0.87	21.400±0.43	33.800±0.36
	ZnONPs 20	11.666±0.57	391.666±38.18	63.600±1.0	44.533±1.89	20.700±0.87	26.700±0.79
	ZnONPs 40	12.333±0.58	400.000±50.00	63.433±0.45	42.033±0.57	24.866±0.75	28.600±0.65

Values depict the average mean of three replications ±Standard deviation

Supplementary Table 3. Analysis of variance (ANOVA) for seed treatments, concentration of Zn-source and Treatment×concentration for photosynthetic pigments of fodder maize crop (variety J-1006) grown under field conditions

Source	DF	Chlorophyll a	Chlorophyll b	Total Chlorophyll	Total Carotenoids	SPAD
DAS	1	2.396***	97.894***	40.082***	0.646***	457.718***
DAS×Rep	2	0.001 ns	0.0007ns	0.000ns	0.0002ns	0.776ns
Trt	1	1.011***	7.072***	7.661***	0.0003ns	183.610***
DAS×Trt	1	4.698***	7.210***	3.019***	0.00001ns	102.547***
DAS×Trt×Rep	4	0.001ns	0.00004ns	0.0003ns	0.0003ns	6.193ns
Conc	4	62.578***	4.431***	51.316***	0.00484***	33.380 **
DAS×Conc	4	5.262***	3.546***	7.424***	0.0002ns	4.460ns
Trt×Conc	4	11.808***	0.661***	13.208***	0.0006 ns	13.228*
DAS×Trt×Conc	4	8.822***	7.969***	3.987***	0.0014**	7.984ns

*= $p \leq 0.05$, **= $p \leq 0.01$, ***=$p \leq 0.001$, ns= not significant

Supplementary Table 4. Interactive effect of seed treatments and concentration of Zn-source on photosynthetic pigments in fodder maize crop (variety J-1006) grown under field conditions

DAS	Seed treatment	Zn source concentration	Chlorophyll a	Chlorophyll b	Total Chlorophyll	Total Carotenoids	SPAD reading
30 DAS	**Priming**	**Control**	1.850±0.020	2.003±0.005	3.726±0.015	0.333±0.020	39.756±3.347
		$ZnSO_4$ 20	9.453±0.015	1.026±0.025	9.913±0.015	0.360±0.010	36.916±1.088
		$ZnSO_4$ 40	8.873±0.015	0.670±0.010	9.010±0.010	0.343±0.015	42.093±5.078
		ZnONP 20	6.820±0.010	2.813±0.015	9.170±0.020	0.423±0.020	42.026±2.558
		ZnONP 40	7.716±0.015	3.276±0.015	10.473±0.015	0.360±0.020	47.093±2.017
	Coating	**Control**	3.836±0.015	3.156±0.025	6.650±0.010	0.346±0.015	47.273±1.334
		$ZnSO_4$ 20	6.370±0.020	2.433±0.015	8.336±0.015	0.356±.015	46.703±1.350
		$ZnSO_4$ 40	6.740±0.020	2.120±0.020	8.466±0.025	0.356±0.020	47.780±0.947
		ZnONP 20	9.826±0.025	1.186±0.015	10.430±0.020	0.376±0.015	47.786±2.179
		ZnONP 40	9.440±0.010	0.860±0.010	9.740±0.020	0.366±0.015	48.910±2.363
60 DAS	**Priming**	**Control**	2.310±0.010	3.813±0.015	6.116±0.015	0.546±0.015	49.446±1.930
		$ZnSO_4$ 20	6.816±0.021	3.936±0.015	10.430±0.020	0.570±0.010	47.666±1.775
		$ZnSO_4$ 40	6.933±0.015	3.423±0.015	9.916±0.015	0.556±0.015	48.323±0.738
		ZnONP 20	7.440±0.010	4.666±0.015	12.023±0.025	0.586±0.005	51.586±1.440
		ZnONP 40	12.013±0.015	3.256±0.015	9.736±0.015	0.603±0.015	51.556±2.021
	Coating	**Control**	4.463±0.015	4.316±0.015	8.476±0.015	0.546±0.015	49.883±1.174
		$ZnSO_4$ 20	4.663±0.015	3.533±0.015	6.640±0.020	0.566±0.015	49.983±1.768
		$ZnSO_4$ 40	7.226±0.015	4.446±0.015	11.153±0.015	0.570±0.026	52.133±0.871
		ZnONP 20	7.460±0.020	8.050±0.036	15.056±0.015	0.603±0.015	49.123±2.239
		ZnONP 40	7.600±0.127	5.650±0.020	12.713±0.015	0.550±0.010	51.876±2.413

Values depict the average mean of three replications ±Standard deviation

Supplementary Table 5. Analysis of variance (ANOVA) for seed treatments, concentration of Zn-source and Treatment×concentration for plant nutrient content of fodder maize crop (variety J-1006) grown under field conditions

Source

	DF	N (kg ha^{-1})	P (kg ha^{-1})	K (kg ha^{-1})	Zn (mg kg^{-1})
Plant-tissue	1	1.87266****	0.067547****	12.1126****	57.14233****
Trt	1	0.73926****	0.153760****	53.6385****	105.95025****
Plant-tissue×Trt	1	0.22082****	0.016863****	0.28866****	16.21412****
Conc.	4	0.53016****	0.131060****	77.9427****	22.51283****
Plant-tissue×Conc.	7	0.05677****	0.025595****	0.92794****	3.154192****
Trt×Conc	4	0.01136****	0.011532****	2.1922****	6.028913****
Plant-tissue×Trt×Conc.	7	0.010030****	0.012835****	2.91840****	2.55473****

*= $p \leq 0.05$, **= $p \leq 0.01$, ***=$p \leq 0.001$, ns= not significant

Supplementary Table 6. Effect of plant tissue type, seed treatments and concentration of Zn-source on plant nutrient content of fodder maize crop (variety J-1006) grown under field conditions

Plant tissue	Seed Treatment	Zn-source concentration	N (kg ha^{-1})	K (kg ha^{-1})	P (kg ha^{-1})	Zn (mg kg^{-1})
Root	**Priming**	**Control**	0.660±0.010	3.306±0.006	1.130±0.010	1.233±0.015
		$ZnSO_4$ 20	0.923±0.021	5.633±0.015	1.226±0.011	2.140±0.020
		$ZnSO_4$ 40	1.070±0.010	7.423±0.006	1.253±0.006	2.066±0.021
		ZnONP 20	1.180±0.020	8.426±0.025	1.140±0.010	2.566±0.011
		ZnONP 40	1.240±0.010	8.723±0.015	1.250±0.010	2.400±0.010
	Coating	**Control**	0.860±0.010	4.810±0.010	1.210±0.010	2.050±0.010
		$ZnSO_4$ 20	1.290±0.010	8.623±0.015	1.230±0.010	4.813±0.015
		$ZnSO_4$ 40	1.440±0.010	8.426±0.367	1.260±0.010	4.753±0.015
		ZnONP 20	1.530±0.010	9.150±0.010	1.273±0.015	8.230±0.010
		ZnONP 40	1.670±0.010	9.373±0.006	1.316±0.015	6.653±0.006
Shoot	**Priming**	**Control**	0.580±0.010	2.750±0.010	1.030±0.010	0.190±0.000
		$ZnSO_4$ 20	0.743±0.015	3.670±0.010	1.073±0.015	2.140±0.010
		$ZnSO_4$ 40	0.780±0.010	7.340±0.010	1.140±0.010	2.203±0.015
		ZnONP 20	0.870±0.010	8.463±0.084	1.340±0.010	2.510±0.010
		ZnONP 40	0.940±0.010	7.566±0.015	1.376±0.015	2.313±0.015
	Coating	**Control**	0.713±0.015	3.316±0.015	1.206±0.168	2.223±0.021
		$ZnSO_4$ 20	0.736±0.015	8.560±0.010	1.273±0.011	3.736±0.015
		$ZnSO_4$ 40	0.840±0.078	7.616±0.015	1.163±0.015	3.950±0.010
		ZnONP 20	0.970±0.010	8.746±0.015	1.250±0.010	8.853±0.015
		ZnONP 40	1.156±0.021	9.046±0.015	1.330±0.010	4.603±0.015

Values depict the average mean of three replications ±Standard deviation

Supplementary Table 7. Analysis of variance (ANOVA) for DAS, seed treatments, concentration of Zn-source and their interactions on soil nutrient content, enzymatic activities and soil microbial viable counts of fodder maize crop (variety J-1006) grown under field conditions

Source	DF	Soil nutrients				Soil enzyme activities			Soil microbial viable cell counts				
		N	K	P	Zn	Dehydrogenase enzyme (µg TPF formed/g of soil /h)	Acid phosphatase enzyme (µg PNP/g of soil)	Alkaline phosphatase enzyme (µg PNP/g of soil)	Bacteria	Fungi	Pseudomonads	Actinobacteria	Non-symbiotic N-fixers
DAS	1	1441.9723****	2372.4624****	237.16840****	1.775040****	0.0064066****	0.01526415****	0.75488167****	0.03825****	0.621387****	0.180401****	0.100860****	0.0000016****
Trt	1	27718.6624****	1969.8594****	1.080042****	0.311040****	0.0224266****	0.58746615****	4.3794016****	0.32105****	0.146619****	0.002281**	0.09282****	1.617041****
DAS×Trt	1	9.53611****	543.06433****	66.549602****	4.681626****	0.216000*****	0.00098415**	0.37921500****	0.000370ns	0.040248****	0.00140**	0.002940****	0.3124816*
Conc	4	19318.288****	1219.33486****	590.69793****	0.595540****	1.38438****	0.60922248****	1.04789417****	0.1938916****	0.184619****	0.154722****	0.0948766****	1.354151****
DAS×Conc	4	30.37863*****	196.18745****	5.818389****	1.285173****	0.01872750****	0.00200248****	0.14719417****	0.0008808**	0.023567****	0.14855****	0.0067016****	0.1383935ns
Trt×Conc	4	1698.03638****	1034.5567****	47.33384****	0.641156****	0.03088083****	0.00965865****	0.10643083****	0.12154993****	0.065277****	0.02257****	0.0209433****	0.51250****
DAS×Trt×Conc	4	52.16356*****	411.086460****	64.894856****	1.533893****	0.08705417****	0.00146498***	0.07696083****	0.00093543****	0.008368****	0.003680****	0.0041650****	0.041340ns

*= $p \leq 0.05$, **= $p \leq 0.01$, ***= $p \leq 0.001$, ns= not significant

Supplementary Table 8. Effect of DAS, seed treatments and concentration of Zn-source on soil nutreint content, and microbiological characteristics in fodder maize crop (variety J-1006) grown under field conditions

DAS	Seed treatment	Zn source concentration	N	K	P	Zn	Dehydrogenase activity	Acid phosphatase	Alkaline Phosphatase	Bacteria	Fungi	Pesudomonads	Actinobacteria	Non-symbiotic N-fixers
35 DAS	**Priming**	**Control**	122.886±0.030	184.96±0.54	9.27±0.01	2.12±0.02	0.610±0.010	0.410±0.010	0.540±0.010	2.650±0.010	1.546±0.015	2.240±0.010	2.360±0.010	2.016±0.021
		$ZnSO_4$ 20	149.256±0.025	208.95±0.57	18.88±0.01	2.84±0.01	1.263±0.021	0.756±0.015	0.460±0.010	2.760±0.010	1.536±0.015	2.163±0.015	2.326±0.015	3.133±0.006
		$ZnSO_4$ 40	190.736±0.015	206.28±0.70	18.27±0.02	3.12±0.01	1.320±0.010	0.863±0.025	0.520±0.010	2.710±0.010	1.413±0.015	2.173±0.011	2.416±0.015	3.266±0.021
		ZnONP 20	228.256±0.025	186.86±1.67	23.43±0.25	2.32±0.01	1.650±0.010	0.953±0.015	0.766±0.015	2.933±0.015	1.860±0.020	2.433±0.015	2.340±0.010	3.366±0.015
		ZnONP 40	237.033±0.025	194.27±1.04	26.07±0.01	3.15±0.01	1.670±0.020	1.060±0.020	0.880±0.010	2.973±0.015	1.933±0.015	2.470±0.010	2.426±0.015	3.440±0.010
	Coating	**Control**	175.566±0.252	192.06±1.37	15.44±0.01	1.33±0.01	0.836±0.006	0.636±0.015	0.610±0.010	2.690±0.010	1.656±0.015	2.133±0.015	2.233±0.006	2.803±0.592
		$ZnSO_4$ 20	223.910±0.020	178.82±0.45	14.32±0.01	0.93±0.00	1.210±0.010	1.033±0.015	0.840±0.010	3.143±0.021	1.730±0.010	2.230±0.010	2.433±0.006	3.300±0.020
		$ZnSO_4$ 40	237.550±0.010	195.84±1.44	16.14±0.02	2.91±0.01	1.246±0.015	1.025±0.001	0.926±0.015	3.060±0.010	1.820±0.010	2.350±0.010	2.460±0.010	3.420±0.010
		ZnONP 20	245.466±0.152	216.39±1.04	28.06±0.03	2.53±0.03	1.370±0.010	1.133±0.015	1.320±0.010	2.876±0.015	1.966±0.15	2.473±0.015	2.516±0.015	3.370±0.010
		ZnONP 40	256.626±0.021	225.44±1.08	31.15±0.01	2.34±0.01	1.443±0.015	1.163±0.015	1.376±0.015	2.963±0.015	1.870±0.010	2.403±0.015	2.550±0.010	3.250±0.010
60 DAS	**Priming**	**Control**	128.550±0.010	188.74±1.18	10.87±0.01	2.05±0.04	0.810±0.010	0.366±0.021	0.220±0.010	2.670±0.010	1.866±0.015	2.270±0.010	2.313±0.015	2.176±0.015
		$ZnSO_4$ 20	155.226±0.015	193.36±0.88	20.55±0.01	3.03±0.01	0.923±0.015	0.716±0.015	0.536±0.011	2.826±0.011	1.736±0.015	2.350±0.010	2.413±0.015	2.946±0.569
		$ZnSO_4$ 40	212.546±0.015	217.39±0.82	23.29±0.07	2.57±0.01	1.050±0.010	0.873±0.015	0.610±0.010	2.760±0.010	1.873±0.011	2.416±0.015	2.436±0.15	2.663±0.577
		ZnONP 20	232.763±0.595	211.75±1.49	33.18±0.02	2.46±0.01	1.476±0.015	0.936±0.006	0.863±0.015	2.966±0.015	1.976±0.015	2.513±0.015	2.496±0.015	3.156±0.577
		ZnONP 40	244.120±0.020	202.89±2.14	38.44±0.01	2.38±0.01	1.550±0.010	0.950±0.010	1.263±0.015	3.031±0.010	2.113±0.015	2.526±0.015	2.550±0.010	3.556±0.006
	Coating	**Control**	184.233±0.015	197.80±0.90	18.31±0.01	2.74±0.01	0.673±0.015	0.630±0.015	0.673±0.012	2.713±0.015	1.820±0.010	2.223±0.015	2.316±0.021	3.230±0.010
		$ZnSO_4$ 20	235.836±0.577	217.06±0.94	20.77±0.01	2.74±0.01	1.313±0.015	0.980±0.020	1.523±0.015	3.176±.015	1.930±0.010	2.430±0.010	2.566±0.015	3.380±0.010
		$ZnSO_4$ 40	246.320±0.010	210.03±0.64	22.57±0.01	2.22±0.01	1.330±0.010	1.010±0.025	1.633±0.031	3.136±0.015	2.022±0.002	2.463±0.015	2.530±0.010	3.463±0.015
		ZnONP 20	257.366±0.015	243.45±0.93	24.34±0.01	3.68±0.01	1.630±0.010	1.116±0.015	1.510±0.010	2.970±0.010	2.063±0.010	2.536±0.15	2.610±0.010	3.436±0.015
		ZnONP 40	268.373±0.015	233.16±2.84	28.46±0.01	3.18±0.01	1.657±0.015	1.136±0.015	1.650±0.020	3.014±0.002	1.966±0.015	2.436±0.015	2.650±0.010	3.353±0.015

Values depict the average mean of three replications ±Standard deviation