Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Supplementary Information

Evaluating the impact of phytosynthesized micronutrient nanoparticles on the growth and propagation of mulberry cuttings: Dose determination and toxicity concerns

Fig. S1 Experimental set-up representing the plantation of mulberry cuttings (0 day).

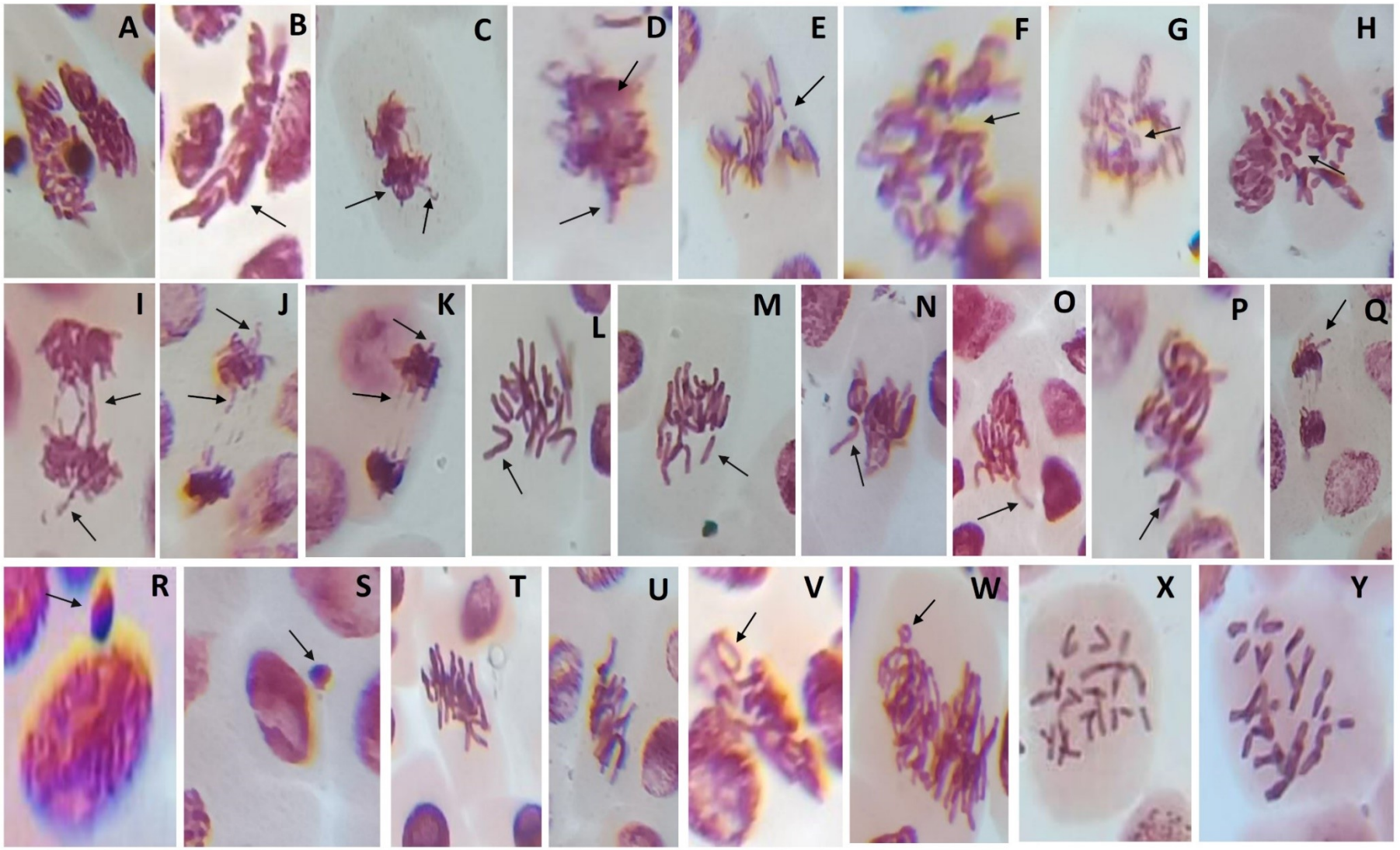

Fig. S2 Various types of chromosomal aberrations observed in the treated *Allium cepa* root tip cell that have been taken in to account for the calculation of aberration percentage: (A, B) sticky metaphase; (C, D) sticky anaphase with laggard chromosome; (E, F, G, H) disrupted metaphase; (I) chromosomal bridge at anaphase with laggard chromosome; (J, K) chromosomal bridge at telophase with laggard chromosome; (L, M, N) laggard chromosome at metaphase; (O, P) laggard chromosome at anaphase; (Q) laggard chromosome at telophase; (R, S) micronuclei at prophase; (T, U) diagonal metaphase; (V, W) ring chromosome; (X, Y) chromosomal breakage.

Table S1 Percentage of divisional stages in root tip cells of treated *Allium cepa*

Treatments	Divisional stage			
	Prophase	**Metaphase**	**Anaphase**	**Telophase**
ZnNP-5	50.372	5.761	0.753	5.740
ZnNP-10	51.526	7.421	0.838	5.252
ZnNP-50	47.545	5.621	0.231	4.027
MnNP-5	50.611	3.541	0.247	3.486
MnNP-10	48.563	4.808	0.487	5.157
MnNP-50	43.352	4.241	0.186	4.737
CuNP-5	41.256	3.605	0.680	2.603
CuNP-10	42.043	2.661	0.135	1.719
CuNP-50	40.083	3.187	0.147	2.776
Negative Control	48.571	4.019	0.244	3.528
Positive Control	38.234	3.575	0.403	2.458

The suffix 5, 10, and 50, followed by the micronutrient NPs, represents the concentration of applied nanoparticles in ppm.

Table S2 Different types and number of chromosomal aberrations in response to various dosages of treated nanoparticles.

Treatments	Aberration types													Sum total
	Sticky metaphase	Sticky anaphase	Disrupted metaphase	Chromosomal bridge at anaphase	Chromosomal bridge at telophase	Laggard chromosome at metaphase	Laggard chromosome at anaphase	Laggard chromosome at telophase	micronuclei at prophase	Diagonal metaphase	Diagonal telophase	Ring chromosome	Chromosomal breakage	
ZnNP-5	2	1	0	1	2	1	0	1	0	0	0	0	0	8
ZnNP-10	2	0	1	0	2	2	0	1	1	1	0	0	0	10
ZnNP-50	4	0	1	0	0	5	1	0	5	0	0	1	0	17
MnNP-5	1	1	2	0	1	1	0	1	4	1	0	0	0	12
MnNP-10	4	2	3	0	0	4	1	2	0	0	0	0	0	16
MnNP-50	4	1	3	1	0	2	0	3	6	1	0	2	0	23
CuNP-5	3	0	0	0	1	2	1	3	8	1	0	0	0	19
CuNP-10	0	0	1	0	0	5	0	0	10	0	0	0	6	22
CuNP-50	4	1	0	0	0	1	0	1	14	2	3	0	0	26
Negative Control	3	3	5	0	0	5	0	3	0	5	1	0	1	26
Positive Control	2	1	1	0	0	7	2	0	0	0	1	1	0	15

The suffix 5, 10, and 50, followed by the micronutrient NPs, represents the concentration of applied nanoparticles in ppm.