Hydrogen peroxide (H_2O_2) treated (PHP) plants showed improved yield parameters across all salinity levels. At 250 mM NaCl, PHP maintained grain numbers at 88.12 per plant, a slight but notable improvement over without hydrogen peroxide (H_2O_2) (WHP). Ear number and weight were also less reduced in Hydrogen peroxide (H_2O_2) treated (PHP) plants, particularly at moderate salinities (50~150 mM), suggesting hydrogen peroxide supported reproductive development by reducing oxidative damage and improving nutrient mobilization. However, at higher salinities, the mitigation was partial, indicating limits to H_2O_2 protective capacity under severe stress.

Table 4 Yield parameters of *Zea mays* under salinity treatments with and without Hydrogen peroxide (H_2O_2) application

Parameters	With and without HP	Salinity treatment (mM NaCl)					
		0	50	100	150	200	250
Number of ears	WHP	2.38±0.18^{a}	2.38±0.18^{a}	2.13±0.23^{a}	1.50±0.19^{b}	1.38±0.18^{b}	1.38±0.18^{a}
	PHP	2.50±0.18^{a}	2.38±0.18^{a}	2.37±0.18^{a}	2.12±0.13^{a}	1.50±0.18^{ab}	1.50±0.18^{ab}
Ear length (cm)	WHP	19.63±1.01^{a}	18.21±0.65^{a}	14.75±0.80^{b}	13.62±0.42^{b}	13.25±0.59^{b}	12.12±0.30^{b}
	PHP	17.87±0.52^{a}	17.37±0.46^{a}	15.62±0.18^{a}	16.00±0.33^{a}	12.25±0.36^{ab}	11.00±0.27^{ab}
Ear diameter (cm)	WHP	13.50±0.13^{a}	14.23±0.08^{a}	14.61±0.22^{a}	13.02±0.60^{a}	12.15±0.94^{a}	14.08±0.19^{a}
	PHP	29.43±15.36^{a}	13.02±0.24^{b}	11.86±0.87^{b}	13.21±0.59^{b}	12.61±0.47^{b}	11.98±0.97^{b}
Ear fresh weight (g)	WHP	307.62±159.77^{a}	93.57±2.30^{b}	85.62±0.65^{c}	75.73±0.76^{b}	72.41±1.41^{b}	73.41±1.29^{b}
	PHP	146.57±1.12^{a}	120.91±1.59^{b}	119.75±11.22^{b}	108.08±1.36^{c}	93.58±0.78^{c}	94.58±0.84^{c}
Ear dry weight (g)	WHP	106.91±1.53^{a}	86.83±0.79^{b}	75.17±0.83^{b}	69.61±1.39^{b}	65.88±1.41^{b}	43.60±0.27^{c}
	PHP	107.56±0.39^{a}	82.96±0.32^{b}	81.68±0.39^{b}	68.12±0.33^{bc}	70.01±0.30^{bc}	50.05±1.67^{c}
Number of grains	WHP	226.25±13.13^{a}	217.38±2.71^{a}	212.13±1.42^{a}	175.50±0.82^{ab}	146.00±11.72^{ab}	84.50±3.85^{b}
	PHP	262.75±13.23^{a}	217.62±12.11^{ab}	169.87±14.84^{b}	177.75±17.14^{b}	111.37±1.50^{bc}	88.12±5.05^{c}
Grain fresh weight (g)	WHP	139.41±1.04^{a}	124.63±0.86^{a}	133.10±1.83^{a}	91.76±0.40^{ab}	92.67±5.56^{ab}	75.65±0.87^{ab}
	PHP	139.73±0.75^{a}	134.12±0.63^{a}	133.70±1.15^{a}	130.07±0.31^{a}	92.11±2.15^{b}	85.57±2.24^{b}
Grain dry weight (g)	WHP	55.78±0.68^{a}	52.87±0.52^{a}	54.26±0.75^{a}	54.01±1.28^{a}	49.36±0.27^{a}	38.89±5.30^{ab}
	PHP	55.60±0.50^{a}	53.71±0.23^{a}	52.83±0.39^{a}	53.58±0.44^{a}	54.90±0.24^{a}	51.83±0.32^{a}
1000 grain weight (g)	WHP	30.88±0.64^{a}	25.25±1.03^{ab}	20.13±0.48^{ab}	22.13±0.52^{ab}	22.75±1.16^{ab}	23.88±1.62^{ab}
	PHP	31.25±0.70^{a}	27.25±1.58^{ab}	23.63±1.45^{ab}	21.12±1.30^{ab}	20.50±0.85^{ab}	18.25±1.15^{c}

Note: Values are mean ± standard error of 8 replicates (Tukey HSD test at $p \leq 0.05$). Mean with the same alphabet(s) along the row are not significantly different from each other. PHP: plus hydrogen peroxide (H2O2); WHP: without hydrogen peroxide (H_2O_2).

3.5 Nutritional and proximate composition

Table 5 shows that salinity stress without hydrogen peroxide (H_2O_2) (WHP) led to significant reductions in grain proximate components. Protein content decreased from 15.14% in the control to 13.44% at 250 mM NaCl, fat from 1.88% to 1.74%, and crude fiber from 3.40% to 2.74%. Concurrently, moisture and ash contents increased, likely due to disrupted metabolic processes and ion accumulation.

Hydrogen peroxide (H_2O_2) treated (PHP) plants maintained higher proximate values under salinity stress. At 250 mM NaCl, protein was sustained at 14.31%, fat at 2.41%, and crude fiber at 2.80%, closer to control levels. This indicates hydrogen peroxide helped stabilize metabolic pathways, reducing the impact of salinity on nutrient synthesis and storage.

3.6 Grain nutritional composition

Salinity without hydrogen peroxide plants increased Na^+ and Cl^- accumulation in grains while reducing key nutrients like potassium, phosphorus, and magnesium, reflecting ion imbalances and impaired nutrient uptake. Hydrogen peroxide (H_2O_2) treated (PHP) mitigated these effects, with lower Na^+ and Cl^- accumulation and better retention of essential nutrients as shown in (Table 5) (e.g., higher potassium levels at all salinities). This suggests hydrogen peroxide improved ion homeostasis, likely through enhanced antioxidant enzyme activity.

3.7 Leaf total chlorophyll content

Table 6 shows that the chlorophyll content declined significantly under salinity stress without hydrogen peroxide, with the lowest levels at 250 mM NaCl due to pigment degradation and chloroplast damage. Hydrogen peroxide