

Investigations on biological activity of *Vetiveria zizanioides* L. Nash, a palingenesis of some important findings in miracle grass

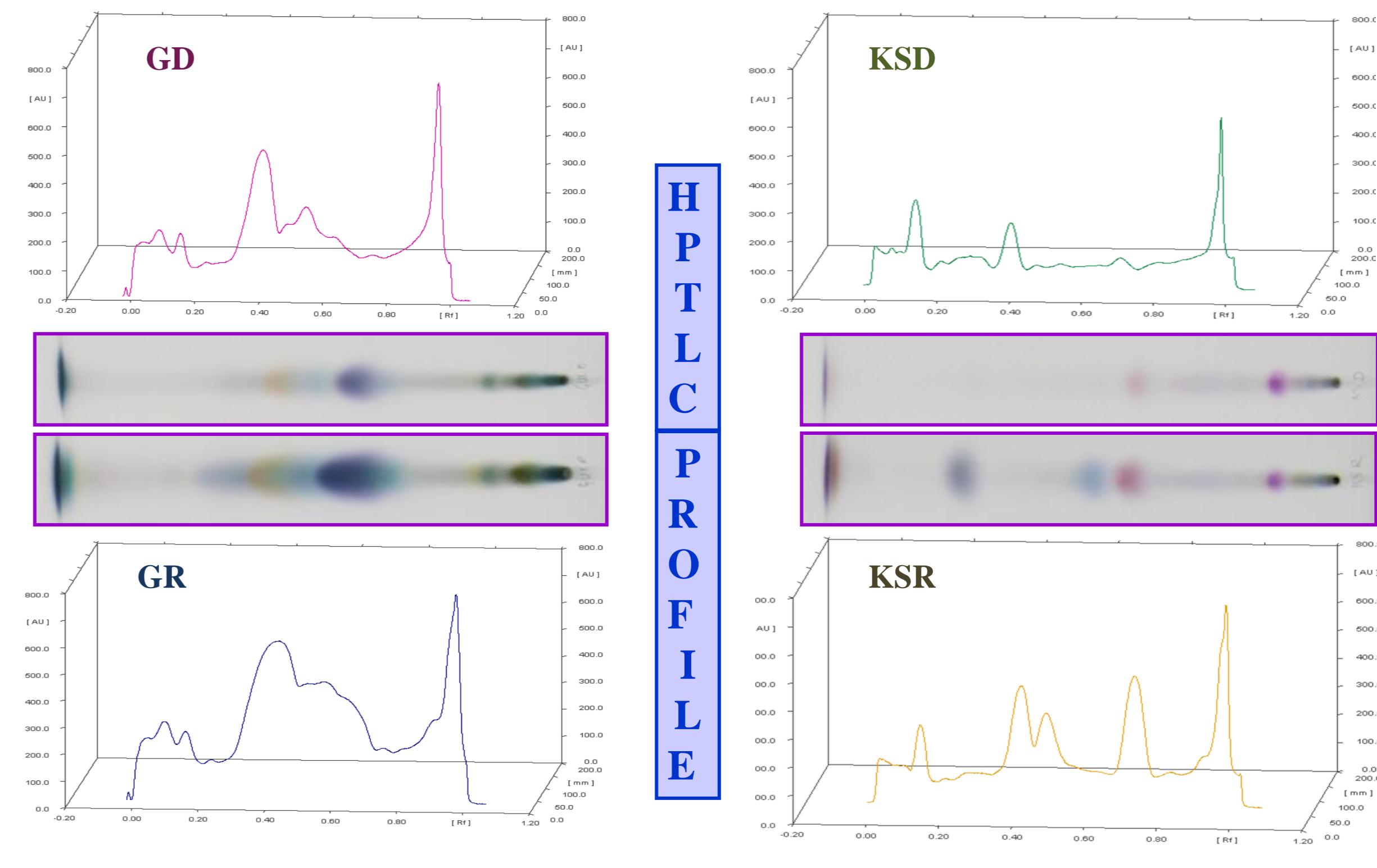
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INCEPTION OF THE WORK

- Vetiveria zizanioides L. Nash synonymously known as *Chrysopogon zizanioides* L. Roberty (Family: Poaceae/Graminae), is widely cultivated in the tropical regions of the world.
- Popularly known as 'KHUS', it is the major source of the well-known vetiver oil with world-wide demand of 250 metric tonnes annually.
- It is a miraculous grass native to India first developed for soil and water conservation by the World Bank during mid 1980s.
- The grass holds application in medicine, cosmetics and in perfumery industries.
- Our focus for the plant was in concern with its pharmacological activities and to discover plant-based biologically active molecules for the scientific validation of its traditional medicinal and phytoremedial value.



EXPERIMENTAL REFERENCES

- To investigate the concentration-dependent antioxidant potential of two genotypes namely KS1 and Gulabi of vetiver distilled and undistilled roots using *in vitro* assay as described under:: 27–32.
- Total Phenolic Estimation: *American Journal of Enology and Viticulture* (1965); 16: 144-158.
- Total Antioxidant Capacity: *Analytical Biochemistry* (1999); 269: 337-341
- DPPH Radical Scavenging Activity : *Journal*
- Reducing Power Assay: *Journal of Agricultural Food Chemistry* (1995); 43of *Agricultural Food Chemistry* (2002); 50: 2454-2458.
- FRAP Assay: *Analytical Biochemistry* (1996); 239: 70-76.
- Hydroxyl Radical Scavenging Assay : *Biochemical Pharmacology* (2002); 44: 205-214.
- Glutathione Estimation: *Pharmaceutical Biology* (2009); 47(6): 483-490.
- Lipid Peroxidation Estimation: *Phytotherapy Research* (2006); 20(4): 303-306.
- Disc Diffusion Assay: *American Journal of Clinical Pathology* (1966); 36: 493–496.
- Broth dilution Assay:

Protective effects of vetiver root extracts (100 µg/mL) on reduced glutathione and malondialdehyde concentration of erythrocytes stressed by hydrogen peroxide

	Control	Hydrogen peroxide	Quercetin (10 µg/mL)	GD	GU	KSD	KSUD
GSH ¹	2.17 ± 0.62	0.915 ± 0.16a	1.266 ± 0.13	2.187 ± 0.59b	2.18 ± 0.82b	2.03 ± 0.77c	2.21 ± 0.77b
MDA ²	0.049 ± 0.005	0.105 ± 0.028b	0.0406 ± 0.004b	0.042 ± 0.03b	0.043 ± 0.04b	0.045 ± 0.03b	0.063 ± 0.026b

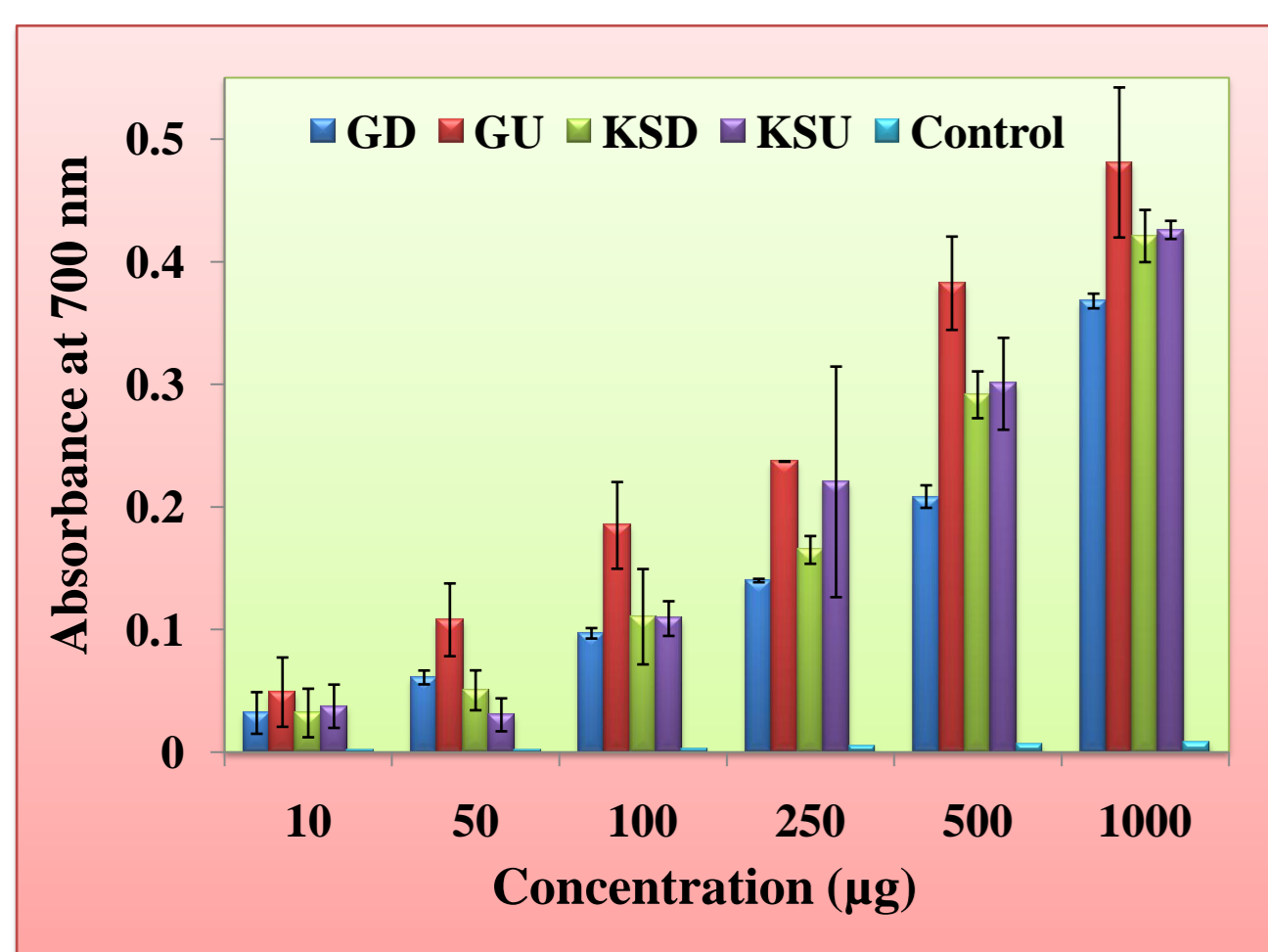
Protective effects of vetiver root extracts (100 µg/mL) on reduced glutathione and malondialdehyde concentration of erythrocytes stressed by tert-butyl hydroperoxide

	Control	Tert-butyl hydro peroxide	Quercetin (10 µg/mL)	GD	GU	KSD	KSUD
GSH ¹	1.99 ± 0.28	1.03 ± 0.67b	1.19 ± 0.52	0.041 ± 0.25	1.07 ± 0.75	0.191 ± 0.1	0.122 ± 0.27
MDA ²	0.049 ± 0.005	0.086 ± 0.014c	0.0376 ± 0.005b	0.135 ± 0.08	0.133 ± 0.12	0.028 ± 0.03b	0.045 ± 0.01c

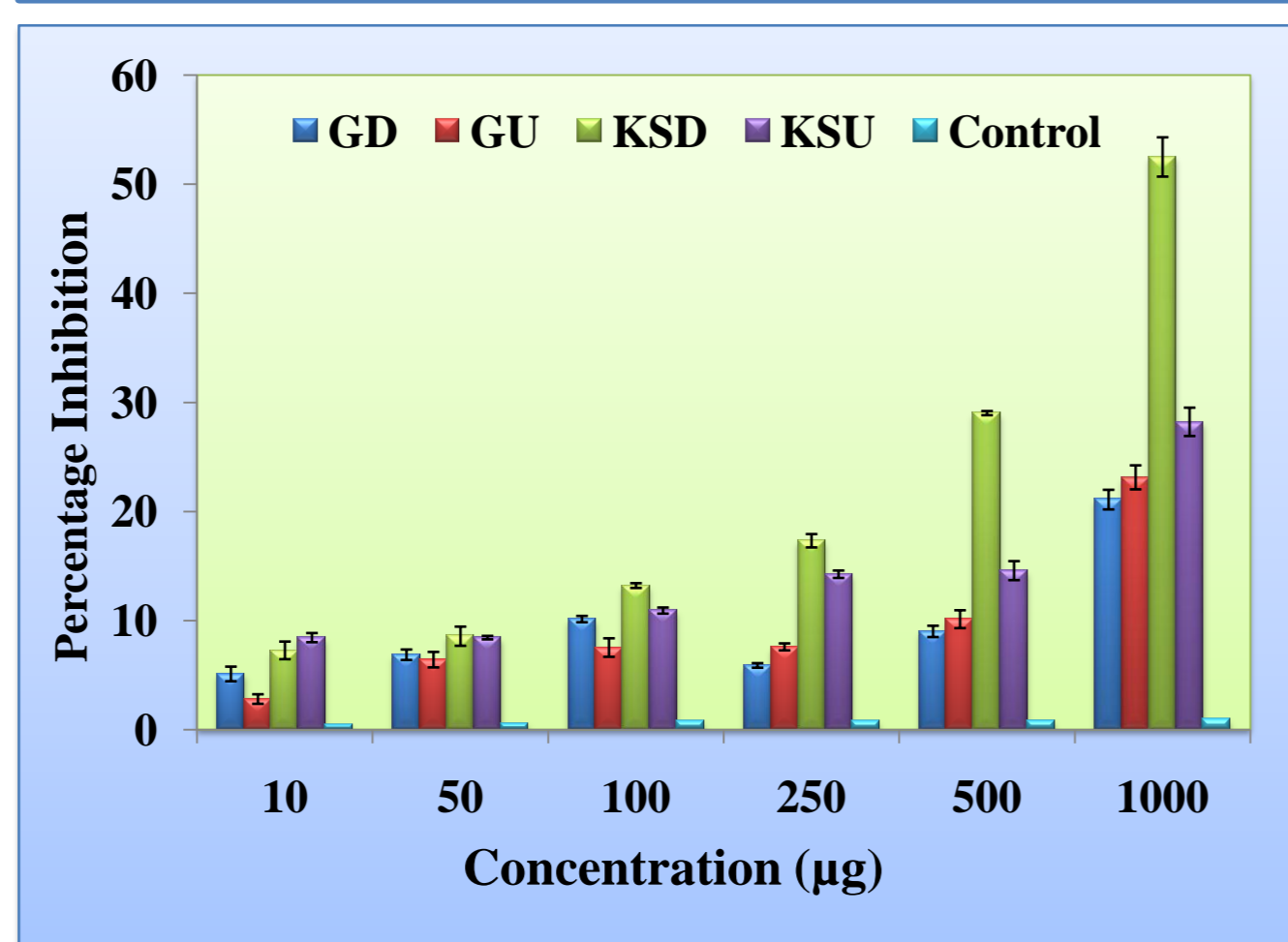
Pharmaceutical Biology 2009, 47: 483-490

RESULTS

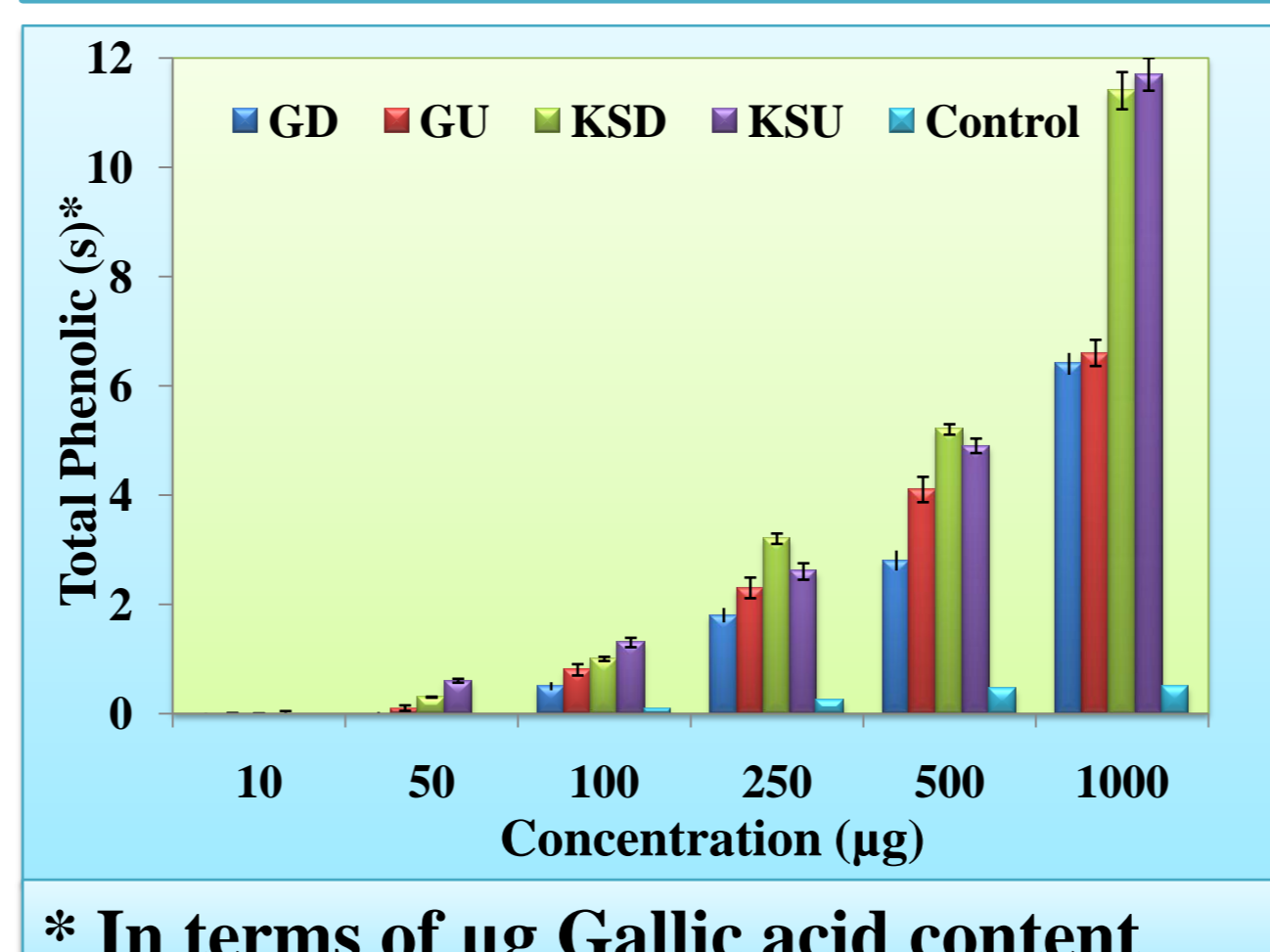
Reducing power of root extracts of *Vetiveria zizanioides* L. Nash



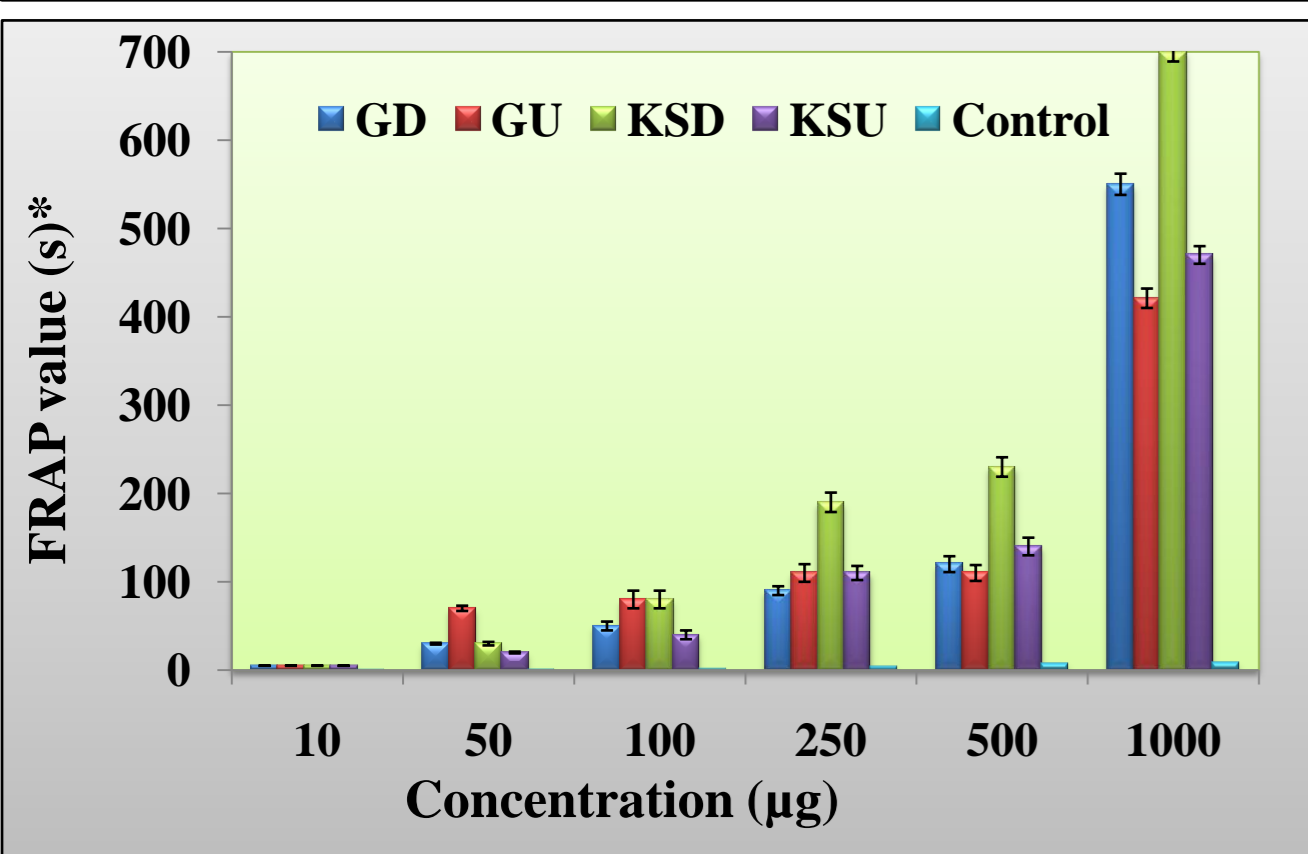
DPPH radical scavenging activity of root extracts of *Vetiveria zizanioides* L. Nash



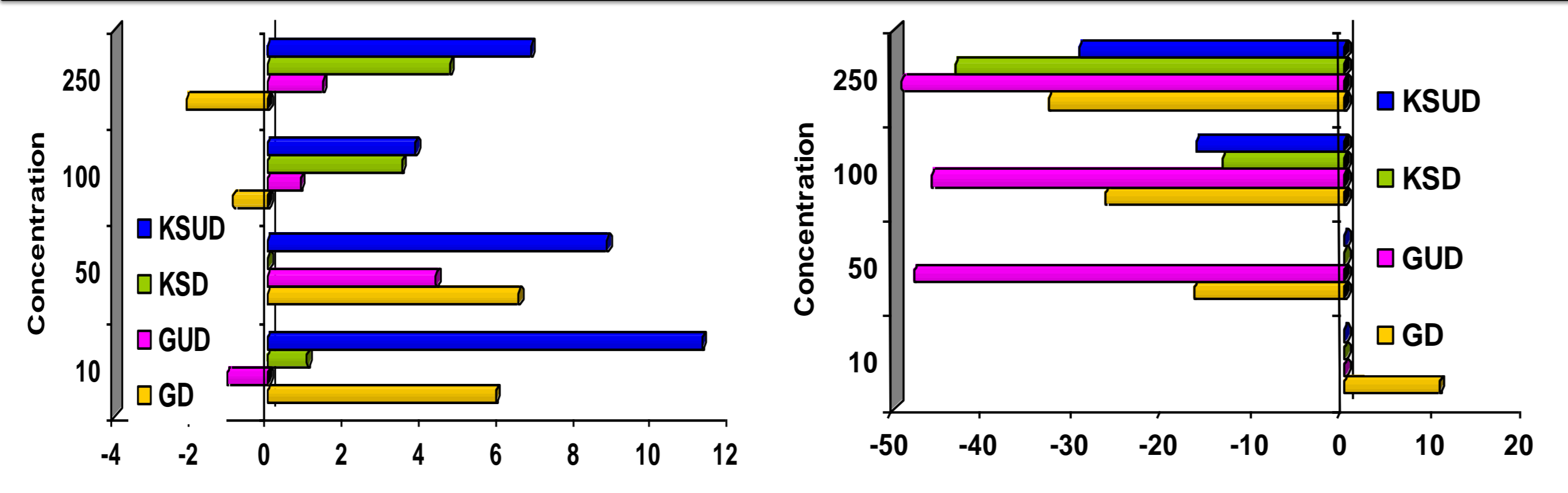
Total phenolics in the root extracts of two genotypes of *Vetiveria zizanioides* L. Nash



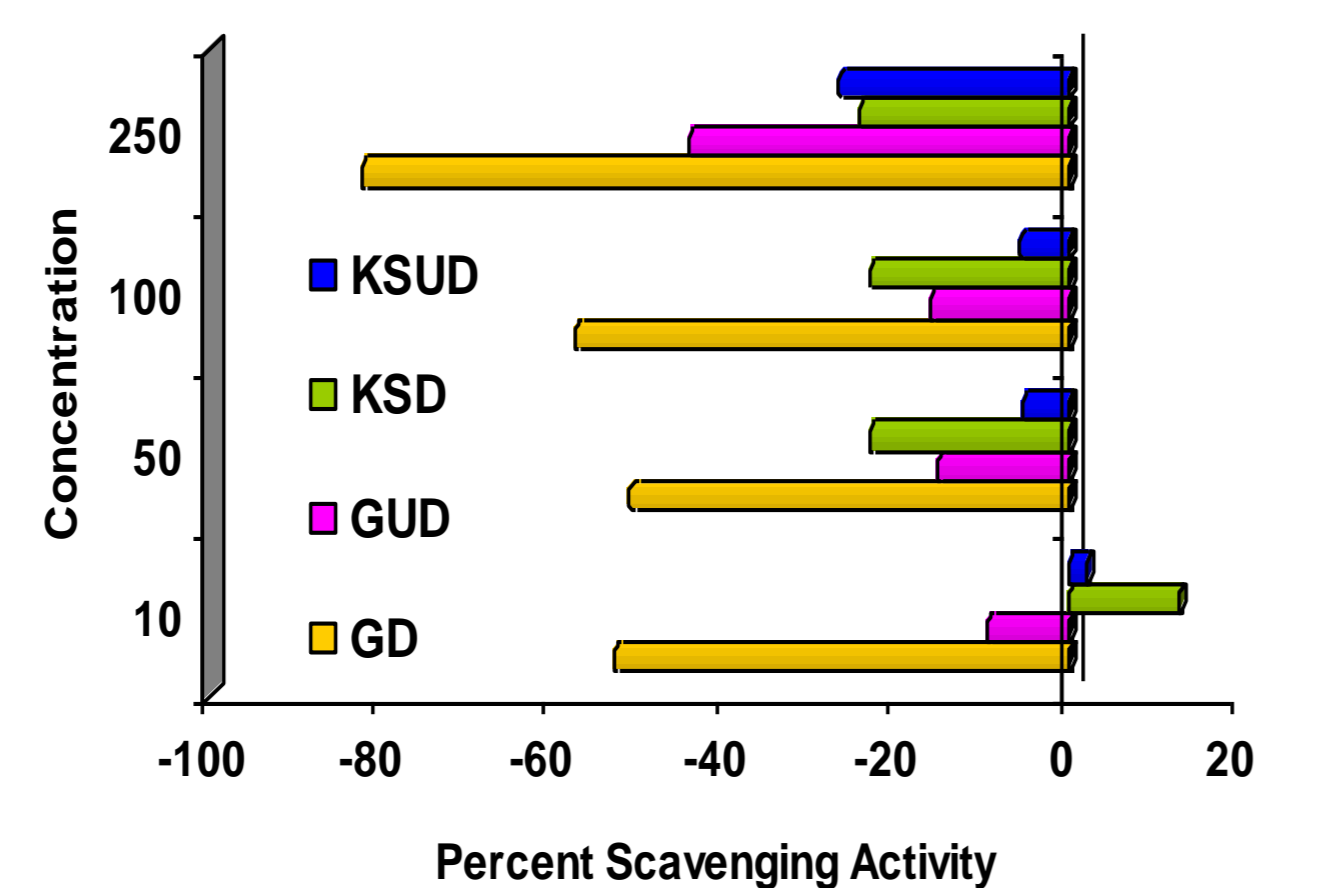
Ferric Reducing Antioxidant Potential of *Vetiveria zizanioides* L. Nash roots



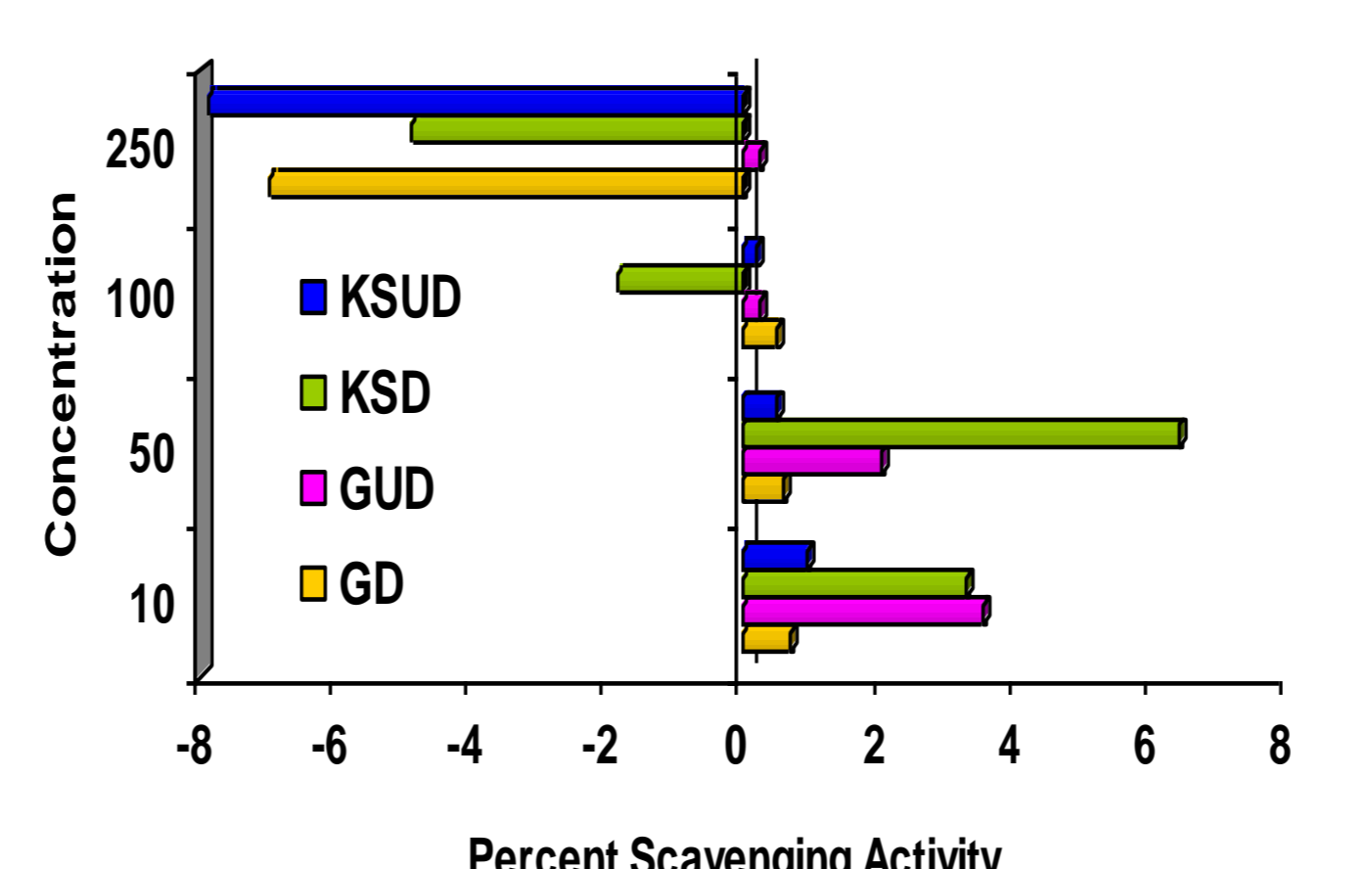
Hydroxyl radical scavenging activity of root extracts of *Vetiveria zizanioides* L. Nash using deoxyribose degradation assay



In the presence of Ascorbic Acid and EDTA



In the absence of both EDTA and Ascorbic Acid



In the presence of Ascorbic Acid but absence of EDTA

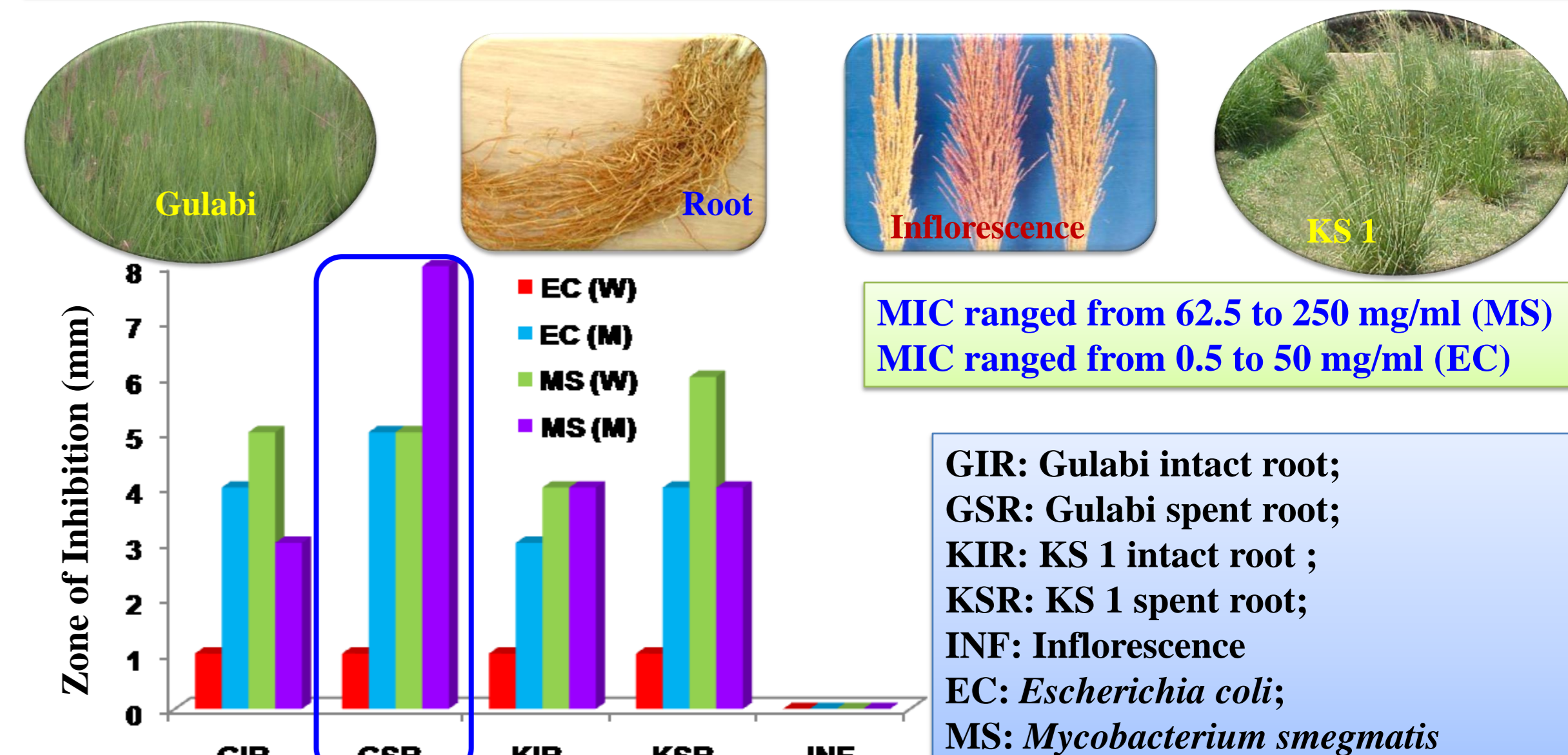
Indian Journal of Biophysics and Biochemistry 2009, 43: 122-125

In the presence of EDTA but absence of Ascorbic Acid

CONCLUSION

- Our present work shows the potent antibacterial, drug-resistant modifying, hydroxyl radical scavenging, anticancer, and antioxidant activity in intact and spent root of vetiver.
- The present finding has implication of isolating the active molecules useful as dietary/supplementary constituent from the waste of vetiver an important plant with high commercial value.

Detection of antimicrobial activity in spent root of *Vetiveria zizanioides*



Plant extracts/ antibiotics	Minimal inhibitory concentration (µg/mL)*	
	M. tuberculosis H37Rv	M. tuberculosis H37Ra
Ethanol extract(intact root)	500	250
Ethanol extract (spent root)	500	500
Hexane fraction	50	50
Ethyl acetate fraction	NA	NA
Methanol fraction	NA	NA
Rifampicin	0.5	0.5
Isoniazid	0.05	0.05
Streptomycin	2.5	2.5
Ethambutol	1.0	2.5

Growth Index of *Mycobacterium tuberculosis* H37Rv in presence and/or absence of plant extracts, hexane fraction and antibiotics by BACTEC 460 TB system

Days	Growth Index						
	Ethanol extract (intact root, 500µg/mL)	Ethanol extract (spent root, 500µg/mL)	Hexane fraction (50µg/mL)	Rifampicin (0.5µg/mL)	Isoniazid (0.05µg/mL)	Ethambutol (1µg/mL)	Control
1	4	4	4	2	2	4	5
2	7	3	2	2	2	4	8
3	11	2	2	2	2	4	9
4	9	0	0	4	4	5	10
5	14	0	0	3	2	2	16
6	12	0	0	2	0	2	31
7	10	0	0	0	0	2	80

- Essential oil and hexane extract of root was found active against Gram positive bacteria and Yeast.
- Spent root extract was also found active against drug resistant mutant

IC ₅₀	WRL-68 (Liver)	MCF-7 (Breast)	PA-1 (Ovary)	Hepatocytes
GSR	18.75	8.3	5.6	100

Pharmaceutical Biology 2005, 43: 732-736

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