Supplementary Material for

Modeling of Orange Carbon Dots-CO_2 Interaction and Its Effects on Photosynthesis and Productivity in Maize and Green Beans

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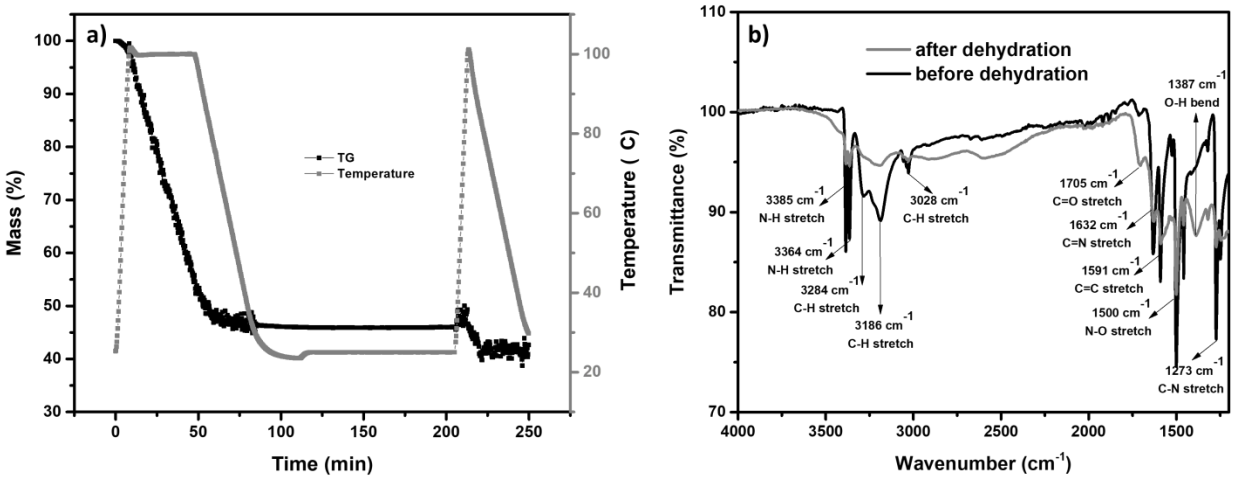

Figure S1. Study of CO_2 adsorption by o-CDs after dehydration: a) TGA of Y-CDs in CO_2 adsorption and desorption processes over time; b) FTIR spectra of o-CDs before and after dehydration.

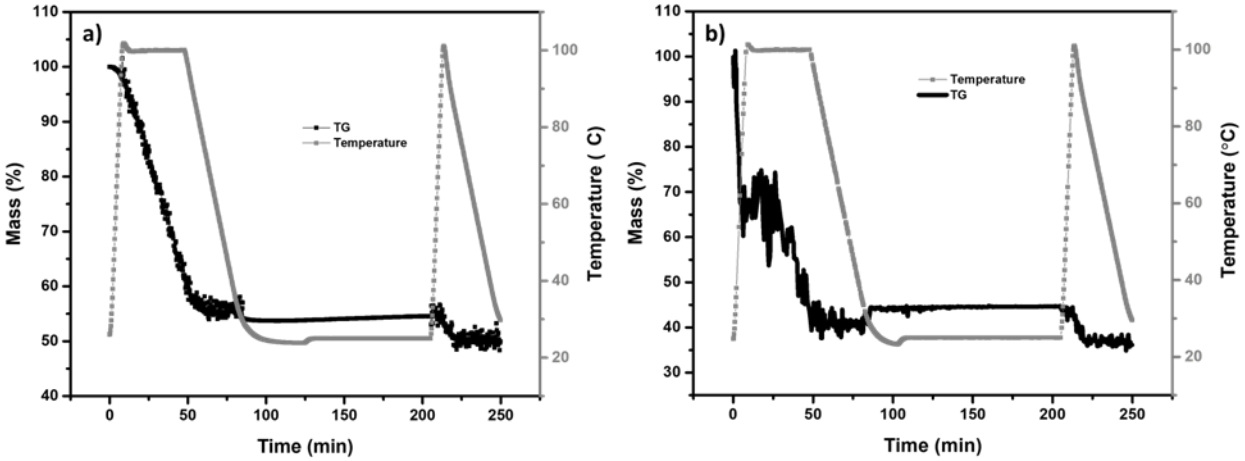

Figure S2. TGA of dehydrated o-CDs in a) CO_2 adsorption and b) CO_2 desorption over time.

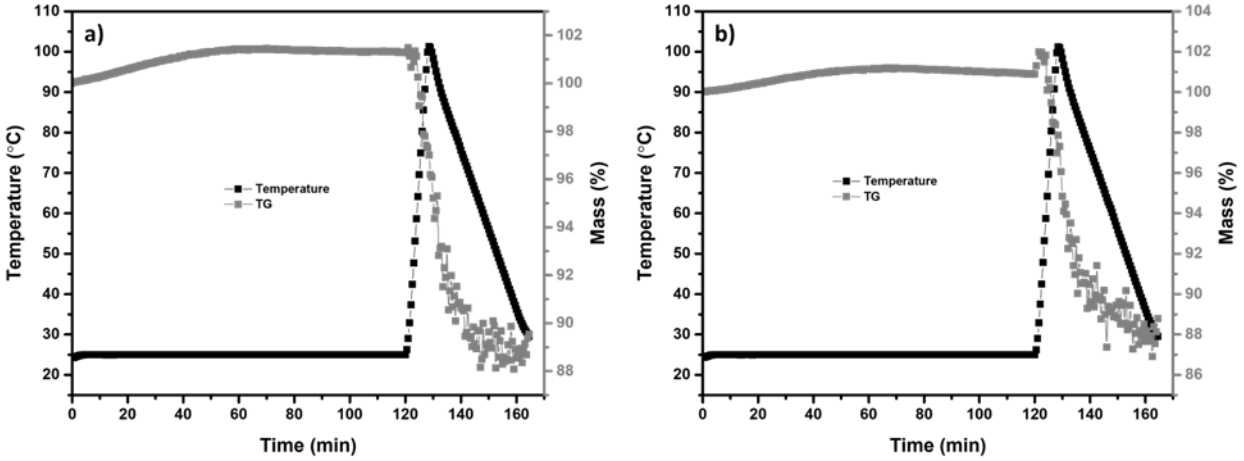

Figure S3. TGA of natural o-CDs in a) CO_2 adsorption and b) CO_2 desorption over time.

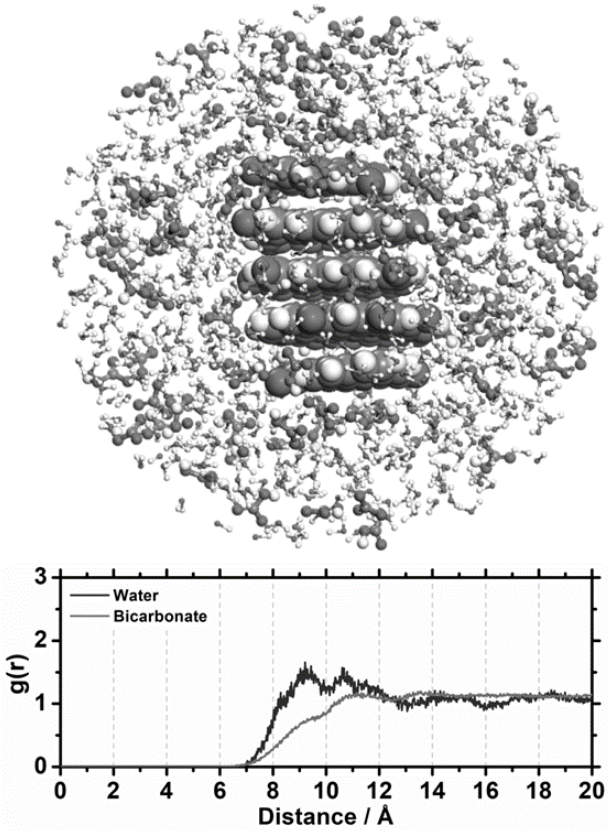

Figure S4. Computational model of o-CDs dissolved in water and HCO_3^- and radial distribution function showing the probability of finding each species from the center of mass of o-CD.

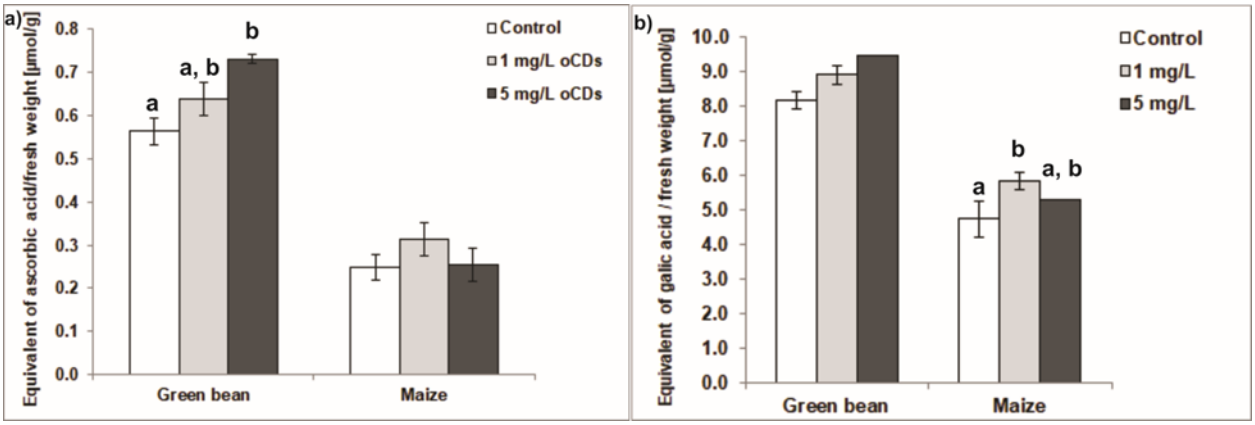

Figure S5. a) Total antioxidative activity (TAA); and b) total phenolic content (TPC) in the leaves of green beans and maize after foliar treatment with two o-CD concentrations. The minor symbols (a, b) indicate the significant differences between the measured parameters and the control, $p < 0.05$.

Table S1. The Yields of Green Beans and Maize Fruits Grown in the Soil after Foliar Treatment with 1 mg/L and 5 mg/L o-CDs

	GREEN BEAN (GB)			MAIZE		
	Mass of fruits (g)	**Length of fruits (cm)**	**Dry/fresh mass of leaves**	**Mass of grains per maize cop/Cop mass**	**Number of grains per maize cop**	**Biomass of maize (g)**
Control	5.003 ± 0.128^{a}	10.186 ± 0.100	0.224 ± 0.002^{a}	$0.783 \pm 0.010^{a,b}$	283.833 ± 36.129	119.624 ± 10.474
1 mg/L	5.420 ± 0.104^{b}	10.427 ± 0.086	0.219 ± 0.003^{a}	0.748 ± 0.020^{a}	256.700 ± 39.504	119.595 ± 8.351
5 mg/L	5.008 ± 0.077^{a}	10.268 ± 0.066	0.207 ± 0.003^{b}	0.802 ± 0.006^{b}	254.400 ± 26.713	109.698 ± 6.633

Note: $^{a, b, c}$ - different letters in the same column denote the significant differences in the measured parameters between treatments and the control; results are presented as mean ± SE, $p<0.05$.

Table S2. Atomic Percentage (%) * for Green Beans' Fruits and Leaves After Foliar Treatment with 1 mg/L and 5 mg/L o-CDs

	C 1*s*	**O 1*s***	**N 1*s***	**P 2*p***	**S 2*p***
Control fruit	70.80 ± 0.44	24.62 ± 0.13	3.47 ± 0.18	0.36 ± 0.05	0.07 ± 0.04
Fruit + o-CDs (1 mg/mL)	75.83 ± 0.54	21.15 ± 0.63	2.24 ± 0.29	0.18 ± 0.02	0.08 ± 0.02
Fruit + o-CDs (5 mg/mL)	73.06 ± 1.42	23.46 ± 0.96	2.49 ± 0.51	0.20 ± 0.03	0.13 ± 0.06
Control leaves	79.64 ± 0.57	16.75 ± 0.36	2.31 ± 0.42	0.11 ± 0.03	0.01 ± 0.01
Leaves + o-CDs (1 mg/mL)	79.80 ± 2.22	16.98 ± 1.69	2.00 ± 0.49	0.23 ± 0.12	0.10 ± 0.03
Leaves + o-CDs (5 mg/mL)	78.67 ± 1.59	17.23 ± 1.38	2.32 ± 0.02	0.23 ± 0.04	0.16 ± 0.11

Note: results are presented as mean ± SE, $p < 0.05$; medium value of 3 measurements.