

Table S1: Composition of different films (A-R)

Film name	Composition
A	0.3% Xanthan gum+ 40% glycerol
B	0.4% Xanthan gum+ 40% glycerol
C	0.3% Guar gum+ 40% glycerol
D	0.4% Guar gum+ 40% glycerol
E	0.3% (Xanthan gum and Guar gum) + 40% glycerol
F	0.4% (Xanthan gum and Guar gum) + 40% glycerol
G	0.3% Xanthan gum+ 0.3% gellan gum+ 40% glycerol
H	0.4% Xanthan gum+ 0.3% gellan gum+ 40% glycerol
I	0.3% Guar gum+ 0.3% gellan gum+ 40% glycerol
J	0.4% Guar gum+ 0.3% gellan gum + 40% glycerol
K	0.3% (Xanthan gum+ Guar gum+ gellan gum)+ 40% glycerol
L	0.4% (Xanthan gum+ Guar gum) + 0.3% gellan gum + 40% glycerol
M	0.3% Xanthan gum+ 0.5% sodium alginate+ 40% glycerol
N	0.4% Xanthan gum+ 0.5% sodium alginate+ 40% glycerol
O	0.3% Guar gum+ 0.5% sodium alginate+ 40% glycerol
P	0.4% Guar gum+ 0.5% sodium alginate + 40% glycerol
Q	0.3% (Xanthan gum+ Guar gum) + 0.5% sodium alginate + 40% glycerol
R	0.4% (Xanthan gum+ Guar gum) + 0.5% sodium alginate+ 40% glycerol

Table S2: Change in the thickness of films (G and O) with increasing OPE concentration

Film		Thickness (mm)
G	1	0.043 ± 0.004^d
5		0.045 ± 0.001^d
10		0.049 ± 0.005^{cd}
15		0.047 ± 0.009^{cd}
20		0.06 ± 0.004^{bc}
O	1	0.064 ± 0.002^b
5		0.045 ± 0.009^d
10		0.069 ± 0.003^b
15		0.073 ± 0.001^{ab}
20		0.085 ± 0.003^a

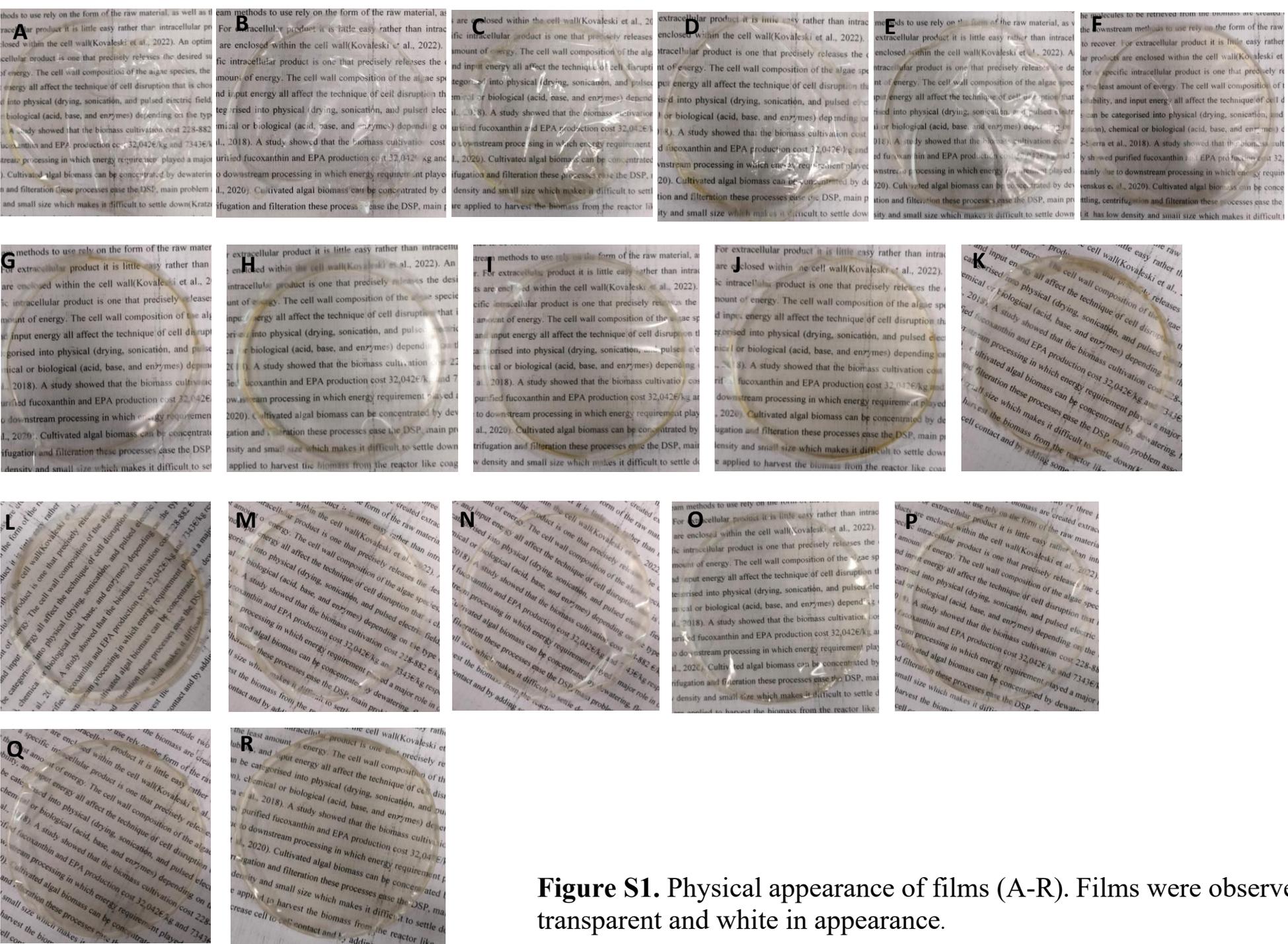


Figure S1. Physical appearance of films (A-R). Films were observed to be transparent and white in appearance.

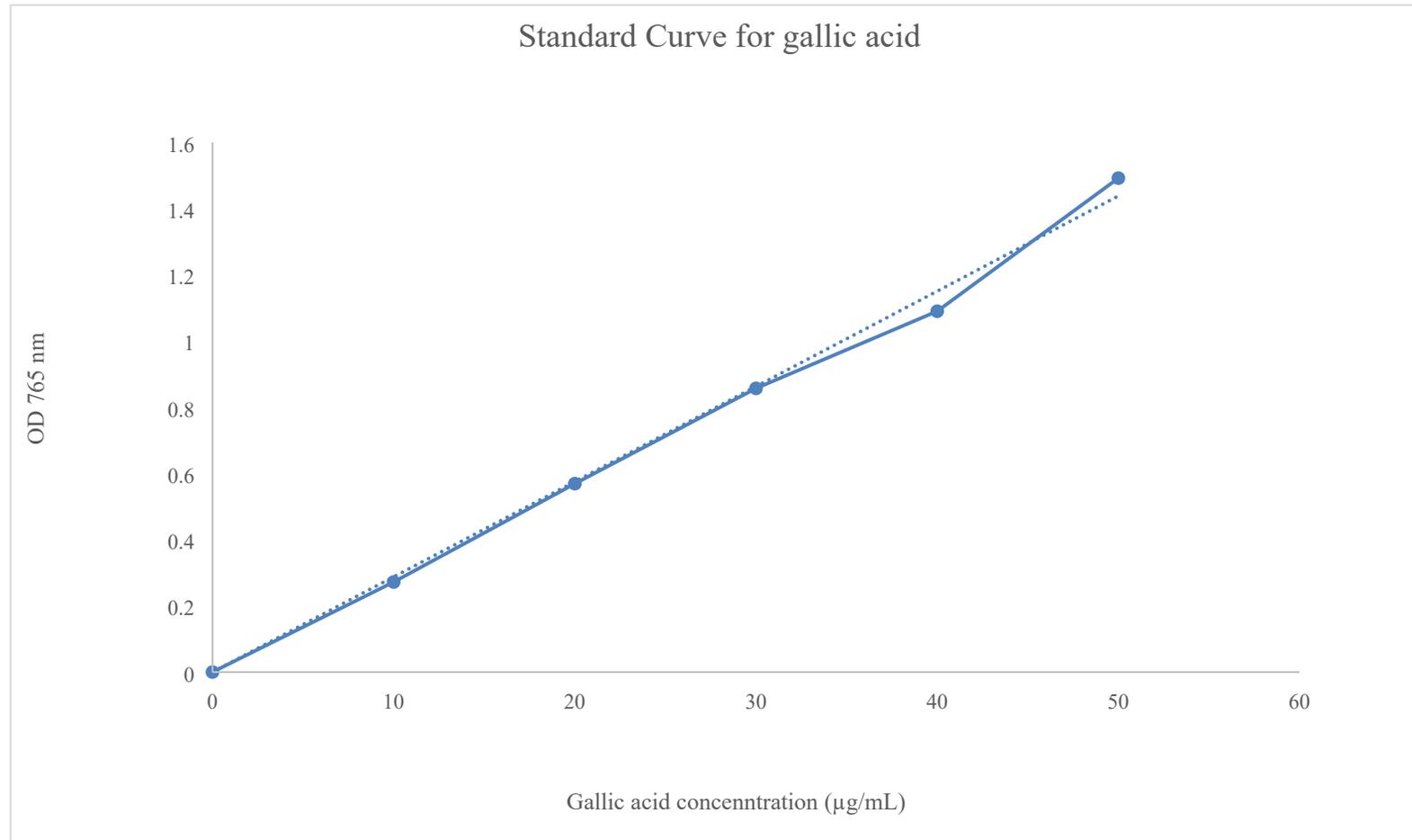


Figure S2. Standard curve for gallic acid

Table S3: TPC of OPE and OPE-activated films.

Sample	TPC (mg GAE/g)	IC50 value (ug/ml)
OPE	393 ± 7.7	17 ± 2.05
OPE film (G1)	3.22	
OPE film (G20)	39.33	
OPE film (I1)	3.39	
OPE film (I20)	48.29	
OPE film (K1)	2.21	
OPE film (K20)	40.28	
OPE film (M1)	4.89	
OPE film (M20)	26.18	
OPE film (O1)	2.79	
OPE film (O20)	51.94	
OPE film (Q1)	3.29	
OPE film (Q20)	40.38	

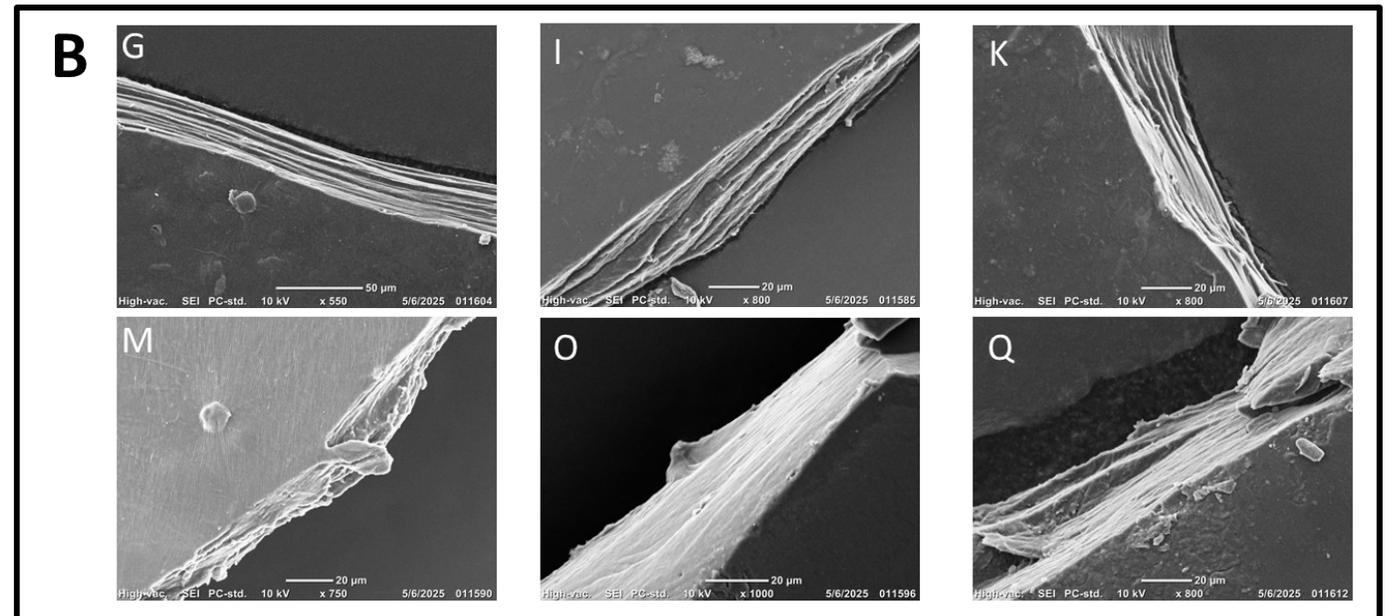
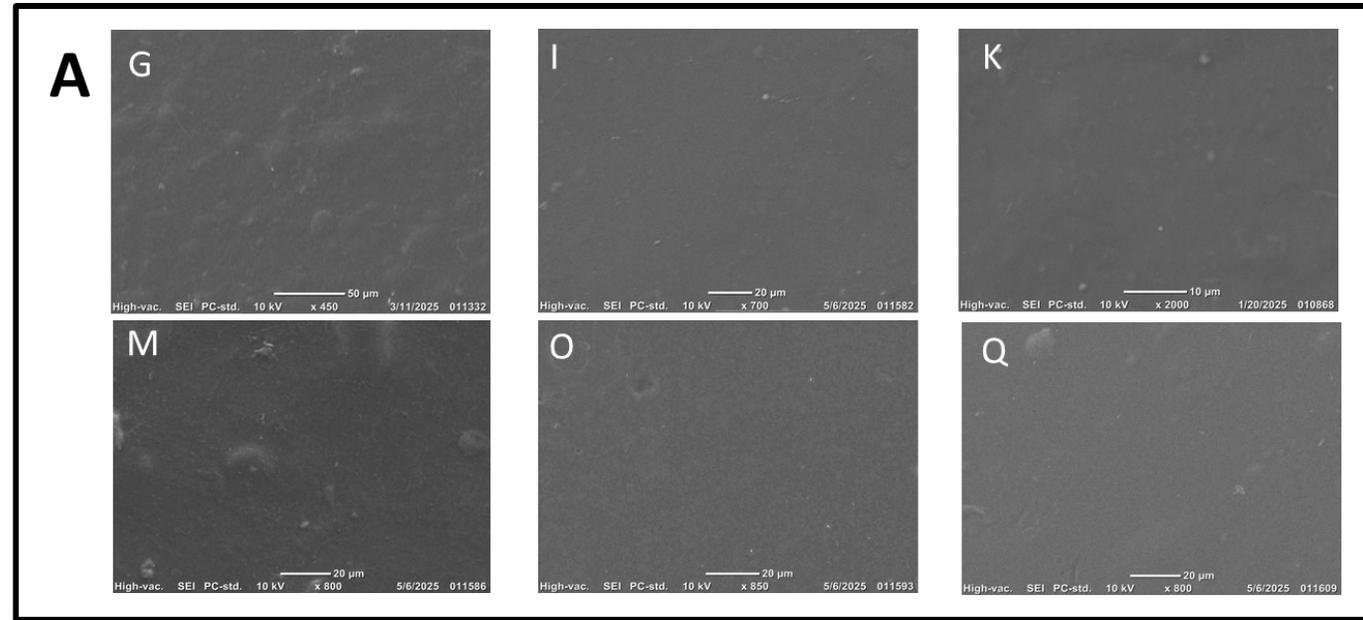
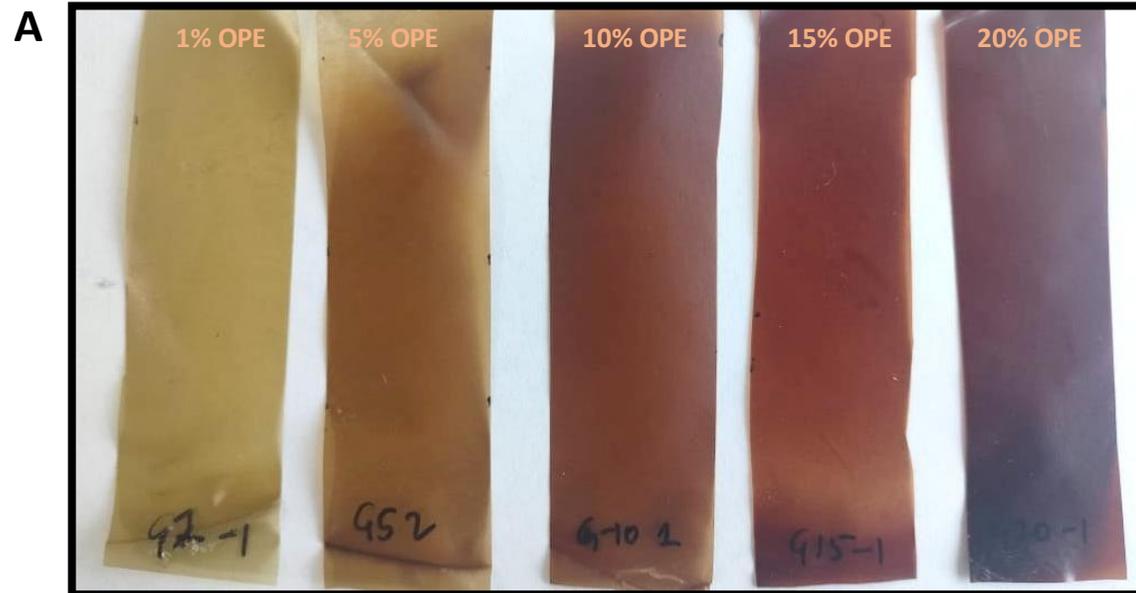


Figure S3. A: SEM showing smooth and uniform surface of the films, B: SEM showing the layered cross-section of the films



Film G: xanthan gum + gellan gum



Film O: Guar gum + sodium alginate

Figure S4. Change in films color with increased OPE concentration (A) Film G (B) Film O

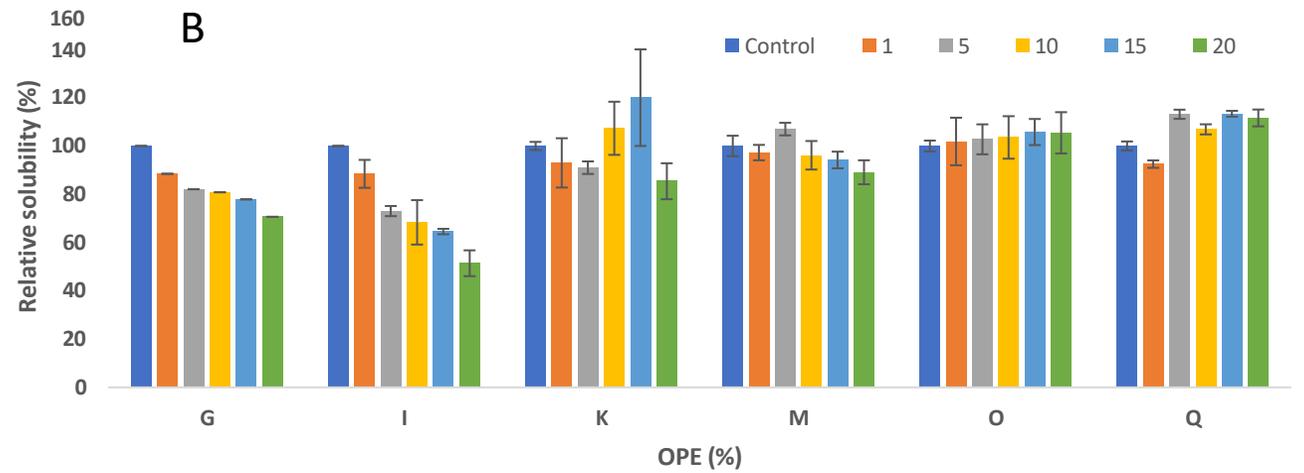
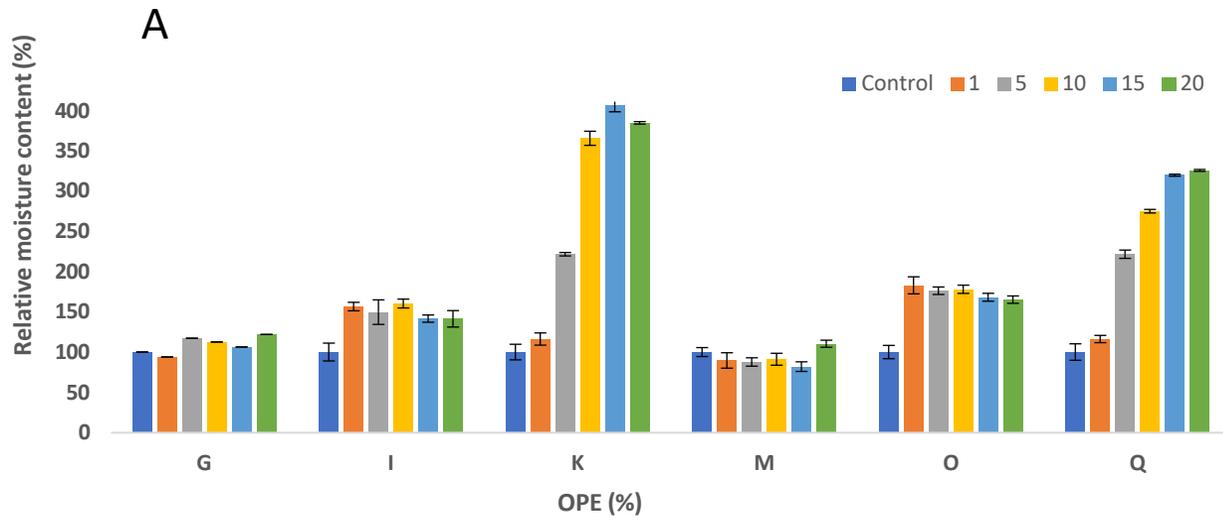


Fig S5: Change in (A) moisture content and (B) Solubility of films with varying OPE concentration

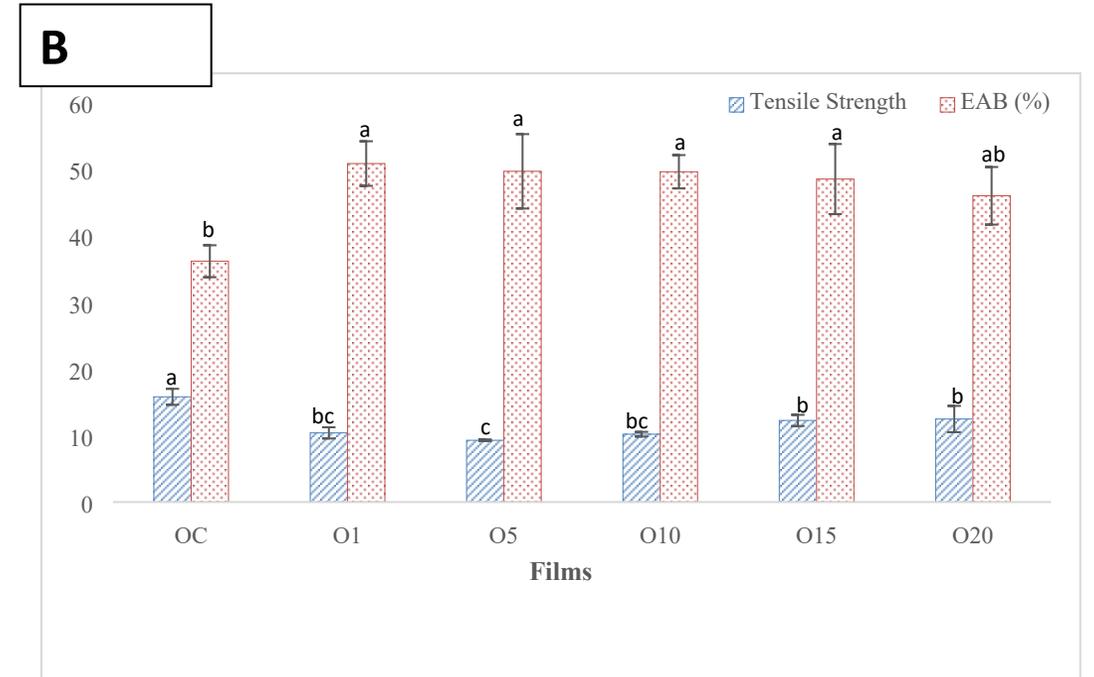
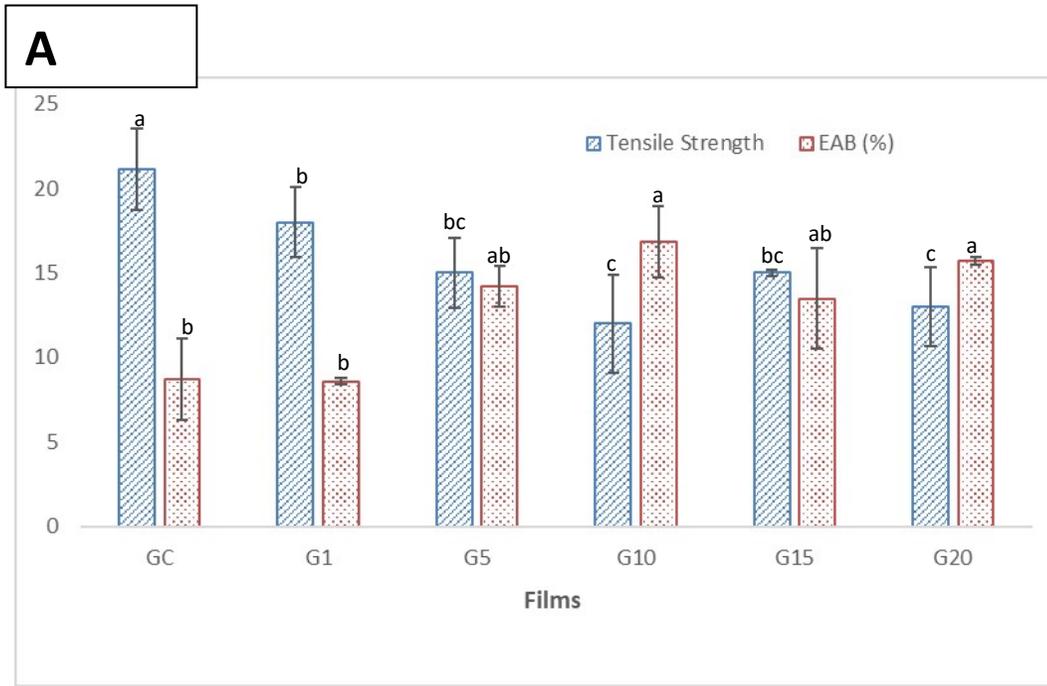
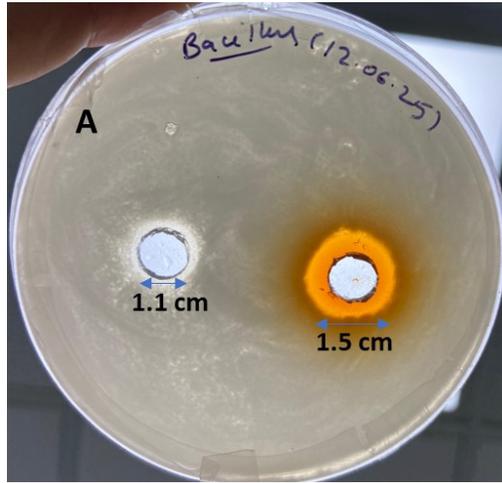
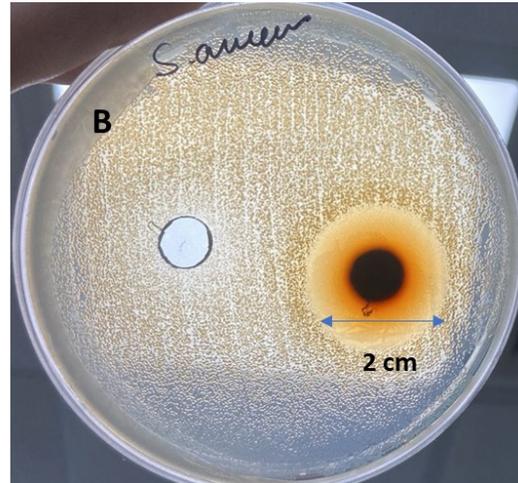


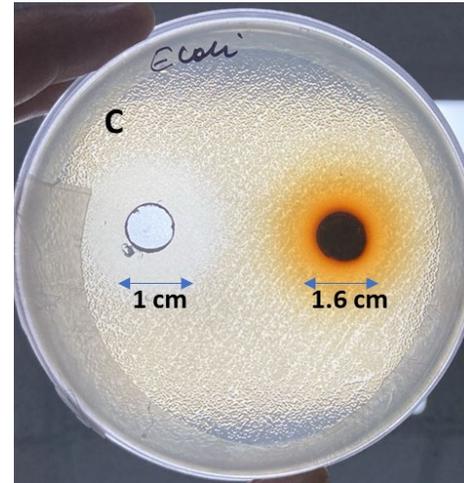
Fig S6: Change in tensile properties of films (A) G, and (B) O, with increase in OPE concentration



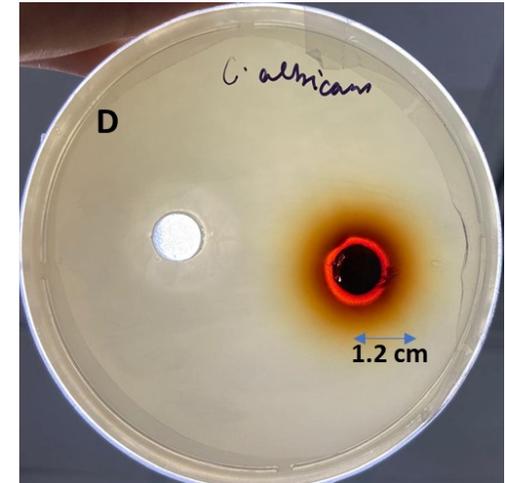
B. megaterium



S. aureus



E. coli



C. albicans

E

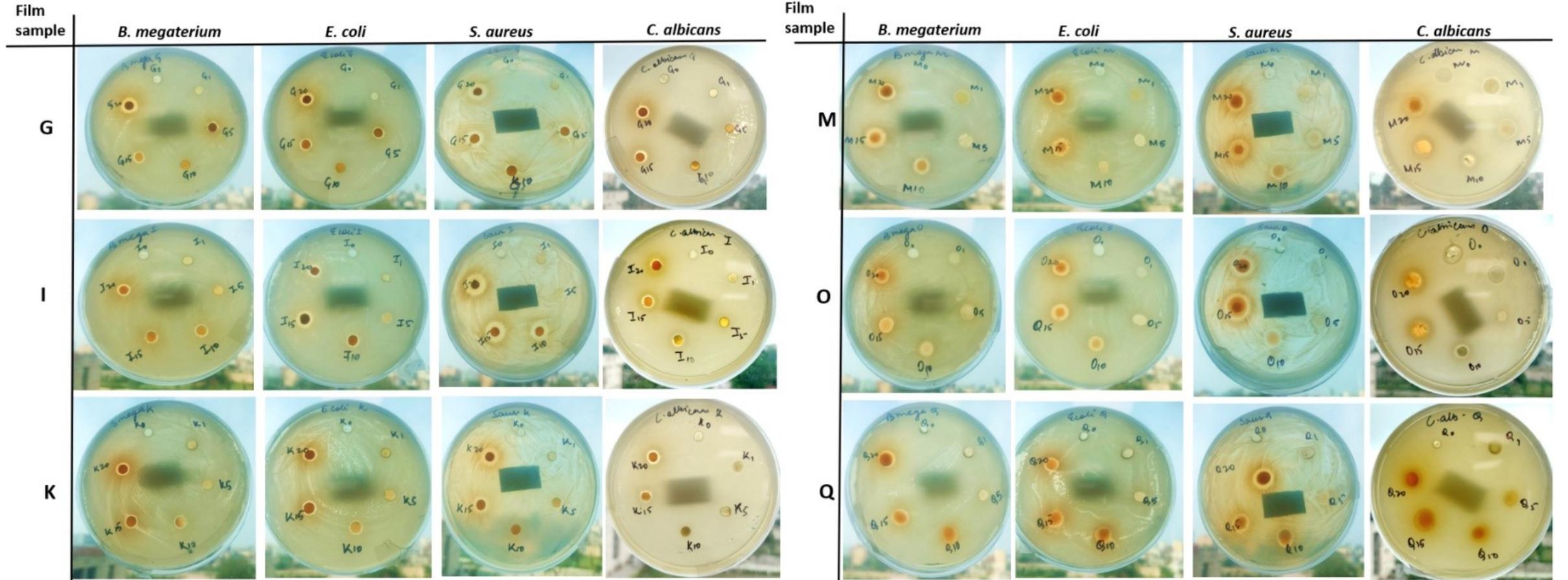


Fig S7: antimicrobial activity of OPE as compared to sodium benzoate on (A) *B. megatrium*, (B) *S. aureus*, (C) *E. coli* and (D) *C. albicans* (E); antimicrobial effect of films (G, I, K, M, O, and Q) with different concentrations of OPE on different microbes. G- Film G without any OPE, G1- Film G with 1% OPE, G5-Film G with 5% OPE, G10-Film G with 10% OPE, G15-Film G with 15% OPE, G20- Film G with 20% OPE. Similar concentrations have been used and marked for other films.

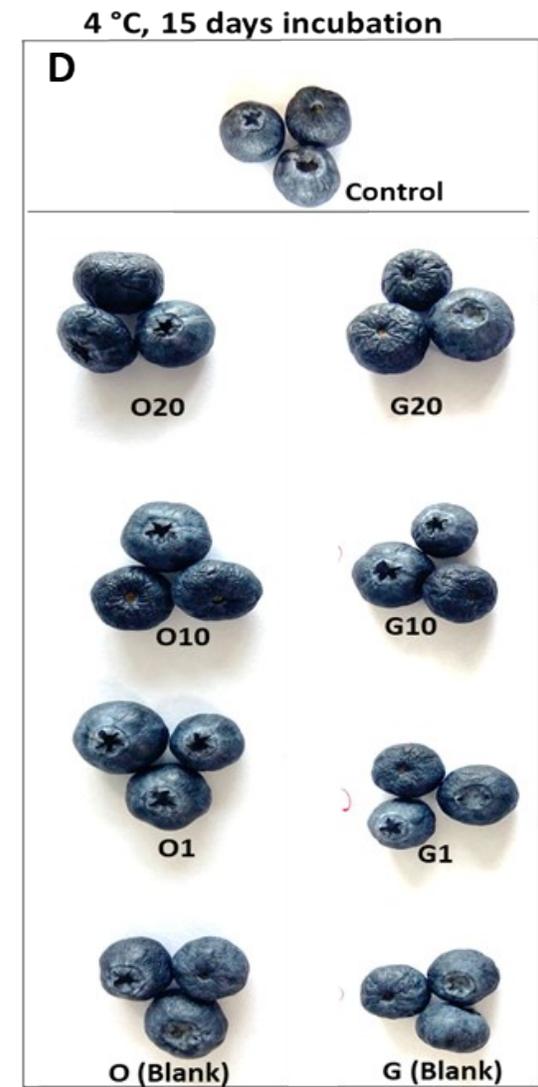
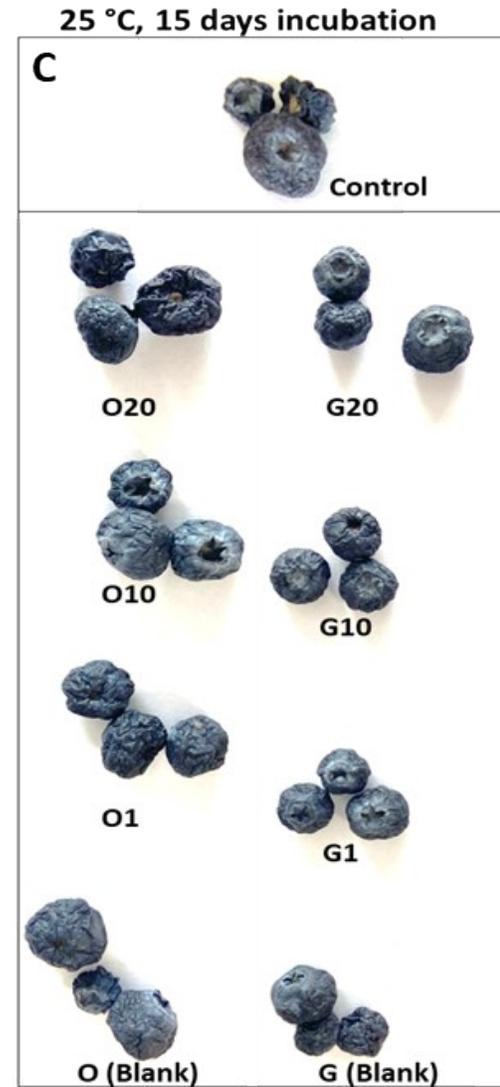


Figure S8: Packaging of blueberries in OPE incorporated films (A-B), Physical appearance of blueberries are 15 days of incubation (C-D)