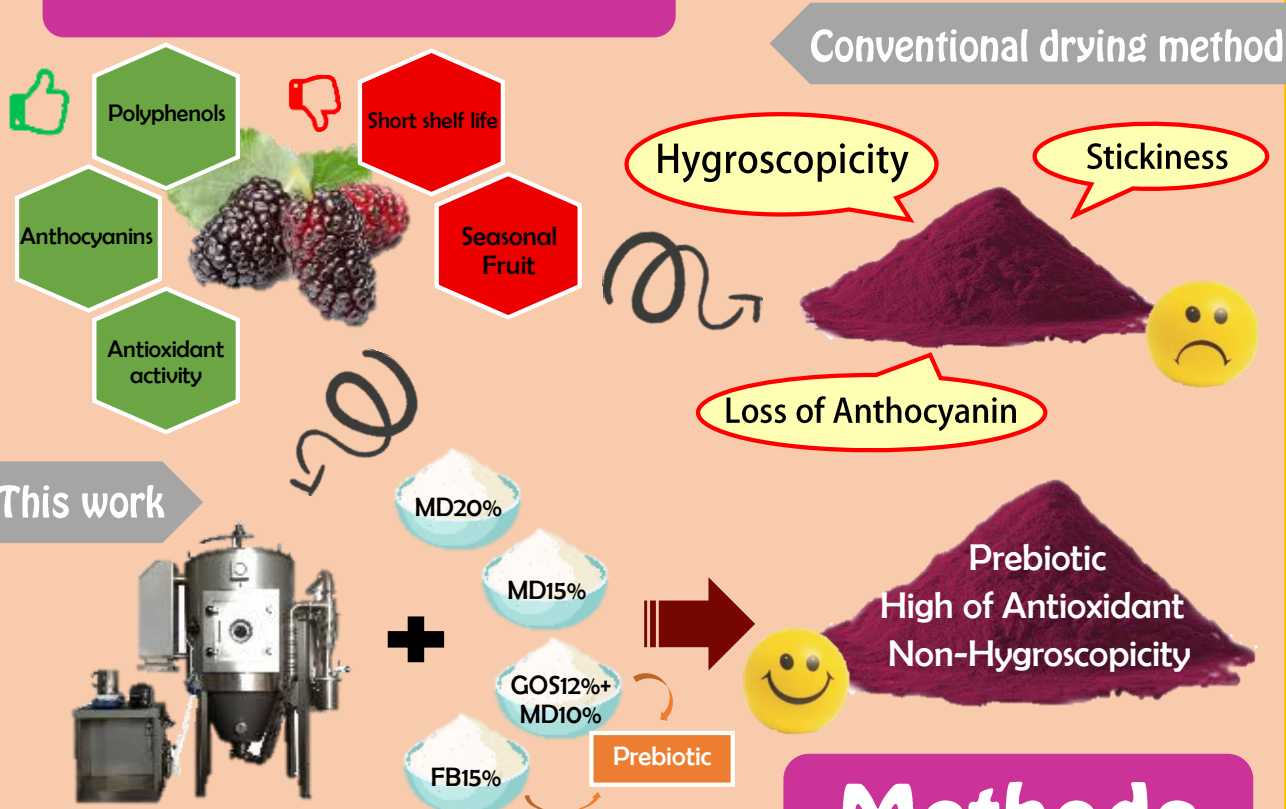


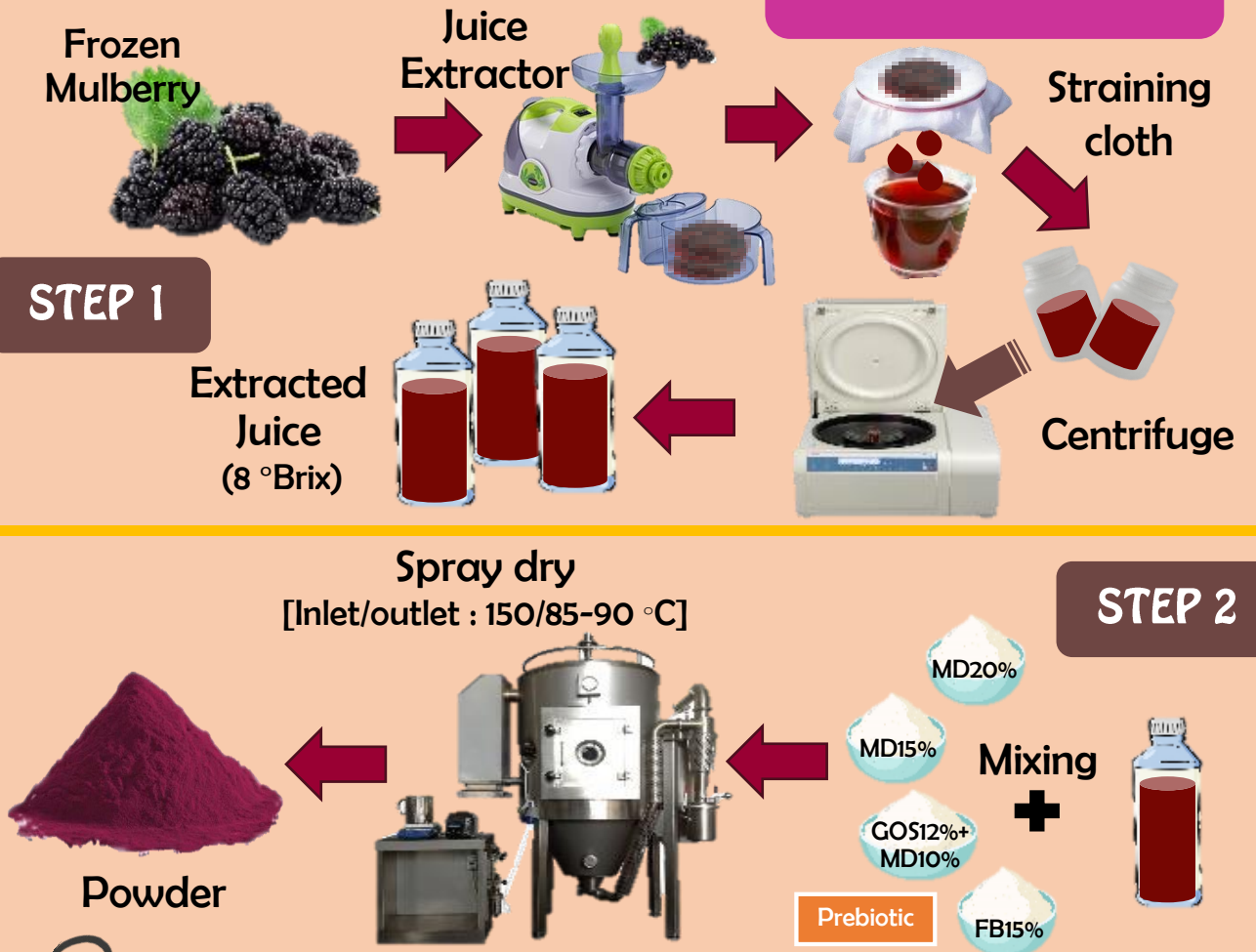
## Abstract

Development of novel food ingredients that promote health via modulation of mulberry juice with prebiotics using spray-dried technique was conducted in this work. Maltodextrin (MD20%,MD15%), fibersol (FB15%), and galacto-oligosaccharide (GOS) mixed with MD (GOS12%+MD10%) were used as prebiotic sources. The effects of prebiotic types on moisture content, water activity, bulk density, solubility, glass transition temperature (Tg), color, microstructure, antioxidants compounds and prebiotic test of spray dried mulberry juice powders were investigated. Between the different drying aids, FB15% shows the best effect on the properties of mulberry juice powders, including the best retention of bioactive compounds, antioxidant activity and physical properties. The growth of probiotic in the presence of FB and GOS powders were better than MD-treatment. Key word : Spray dry, Mulberry powder, Prebiotics

## Introduction



## Methods



- Bulk density**
- Water activity**
- Solubility**
- Tg**
- Microstructure**
- Colour**
- Total Phenolic Content (TPC)**
- Anthocyanin Content (Acy)**
- DPPH assay**
- Prebiotic Test**

## Innovation



## Conclusion

Mulberry mixed with fibersol powder showed the best physicochemical properties. Moreover, mulberry juice mixed with GOS and FB powders increased the growth of probiotic better than MD powders.

## References

Fazaeli, M.; Emam-Djomeh, Z.; Ashtari, A.; Omid, M. Effect of spray drying conditions and feed composition on the physical properties of black mulberry juice powder. *Food and Bioprocess Technology* 2012,90,667-675.

Goula, A.M.; Adamopoulos, K.G. A new technique for spray drying orange juice concentrate. *Innov. Food Sci. Emerg.* 2010,11, 342-351.

## Results & Discussion

Table 1. Physical properties of spray dried mulberry powders.

Treatments	Moisture (%)	Aw	Bulk density (g/ml)	Solubility (%)		Tg (°C)	particle size (µm)
				water	ethanol		
MD20%	5.69±1.29 <sup>a</sup>	0.30±0.00 <sup>a</sup>	0.62±0.01 <sup>a</sup>	97.36±0.17 <sup>c</sup>	0.82±0.03 <sup>a</sup>	33.93±1.25 <sup>b</sup>	209.86±112.65 <sup>a</sup>
MD15%	4.46±0.10 <sup>ab</sup>	0.27±0.01 <sup>b</sup>	0.55±0.05 <sup>bc</sup>	97.34±0.08 <sup>c</sup>	0.86±0.08 <sup>a</sup>	32.60±2.47 <sup>c</sup>	200.19±101.75 <sup>a</sup>
GOS12%+MD10%	4.28±0.74 <sup>ab</sup>	0.21±0.00 <sup>c</sup>	0.58±0.04 <sup>ab</sup>	99.19±0.42 <sup>a</sup>	0.83±0.06 <sup>a</sup>	38.53±5.10 <sup>a</sup>	215.08±87.61 <sup>a</sup>
FB15%	3.80±0.77 <sup>b</sup>	0.22±0.00 <sup>c</sup>	0.50±0.02 <sup>c</sup>	98.14±0.09 <sup>b</sup>	0.82±0.08 <sup>a</sup>	39.81±2.04 <sup>a</sup>	242.24±88.34 <sup>a</sup>

Results are expressed as mean ± SD. Means in the same column with different lowercase letters are significantly different (P < 0.05).

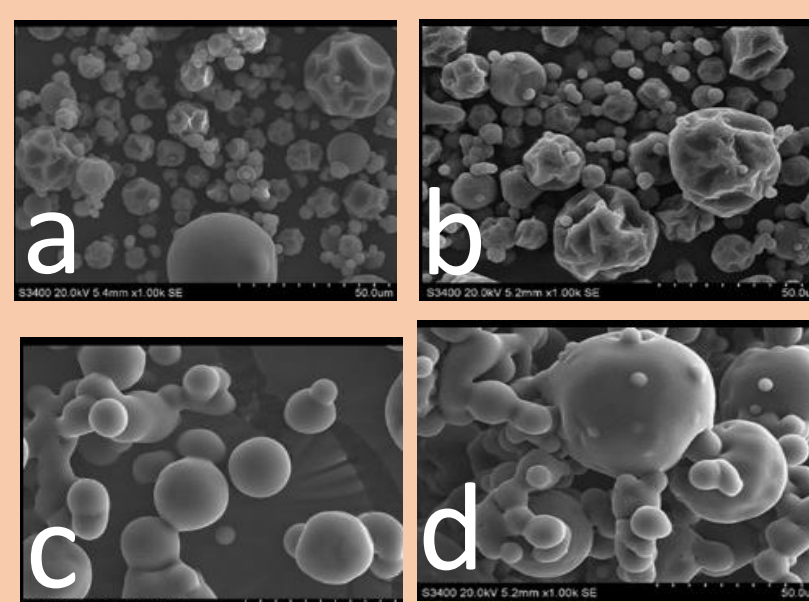


Fig 1. SEM of the mulberry powder particles. (a) Maltodextrin20% ,(b) Maltodextrin15%, (c) GOS12% mix with Maltodextrin10% ,(d) Fibersol15%  
**Fibersol 15% GOOD**  
**GOS12%+MD10% & Fibersol 15% SMOOTH**

Table 2. color of mulberry powders with different carrier.

Treatments	L*	Color a*	b*
MD20%	39.34±0.29 <sup>a</sup>	17.20±0.18 <sup>b</sup>	0.15±0.05 <sup>d</sup>
MD15%	36.47±0.01 <sup>b</sup>	20.00±0.01 <sup>a</sup>	2.97±0.05 <sup>a</sup>
GOS12%+MD10%	36.39±0.16 <sup>b</sup>	16.00±0.10 <sup>d</sup>	1.79±0.05 <sup>c</sup>
FB15%	35.00±0.16 <sup>c</sup>	16.35±0.13 <sup>c</sup>	2.07±0.05 <sup>b</sup>

Results are expressed as mean ± SD. Means in the same column with different lowercase letters are significantly different (P < 0.05).

Table 3. anthocyanin content, total phenolic content (TPC), and antiradical activity of mulberry powders.

Treatments	TPC (mg/g db)	Anthocyanin content (mg/g db)	Antiradical activity (mg TE/g db)
MD20%	16.05±0.36 <sup>b</sup>	250.24±23.73 <sup>c</sup>	394.05±26.46 <sup>b</sup>
MD15%	25.82±1.04 <sup>a</sup>	324.01±17.61 <sup>b</sup>	503.59±53.23 <sup>a</sup>
GOS12%+MD10%	14.65±0.50 <sup>b</sup>	209.04±35.45 <sup>c</sup>	338.51±19.58 <sup>b</sup>
FB15%	26.32±1.96 <sup>a</sup>	399.83±9.49 <sup>a</sup>	519.84±11.00 <sup>a</sup>

Results are expressed as mean ± SD. Means in the same column with different lowercase letters are significantly different (P < 0.05).

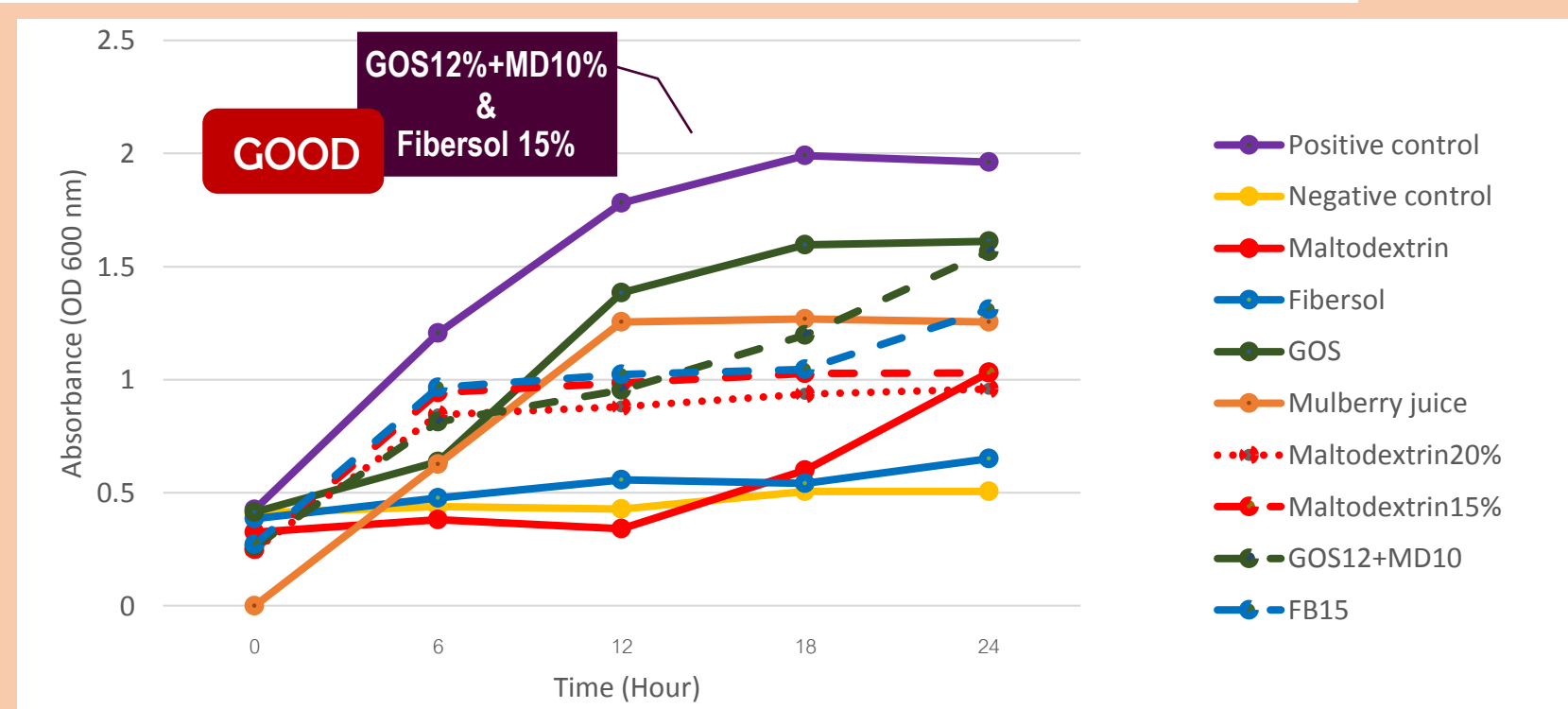


Fig 2. growth of *L. paracasei* in MRS at room temperature.