

Effect of different non-conventional betalain extraction techniques on bioactive compounds and antioxidant properties of fresh and dried *Opuntia stricta* fruit

Nadia SMIRANI¹, Souhir BOUAZIZI¹, Emna BETTAIEB¹ and Moktar HAMDJ¹

Affiliation 1: Laboratory of Microbial Ecology and Technology, The National Institute of Applied Science and Technology, University of Carthage, BP 676,1080 Tunis

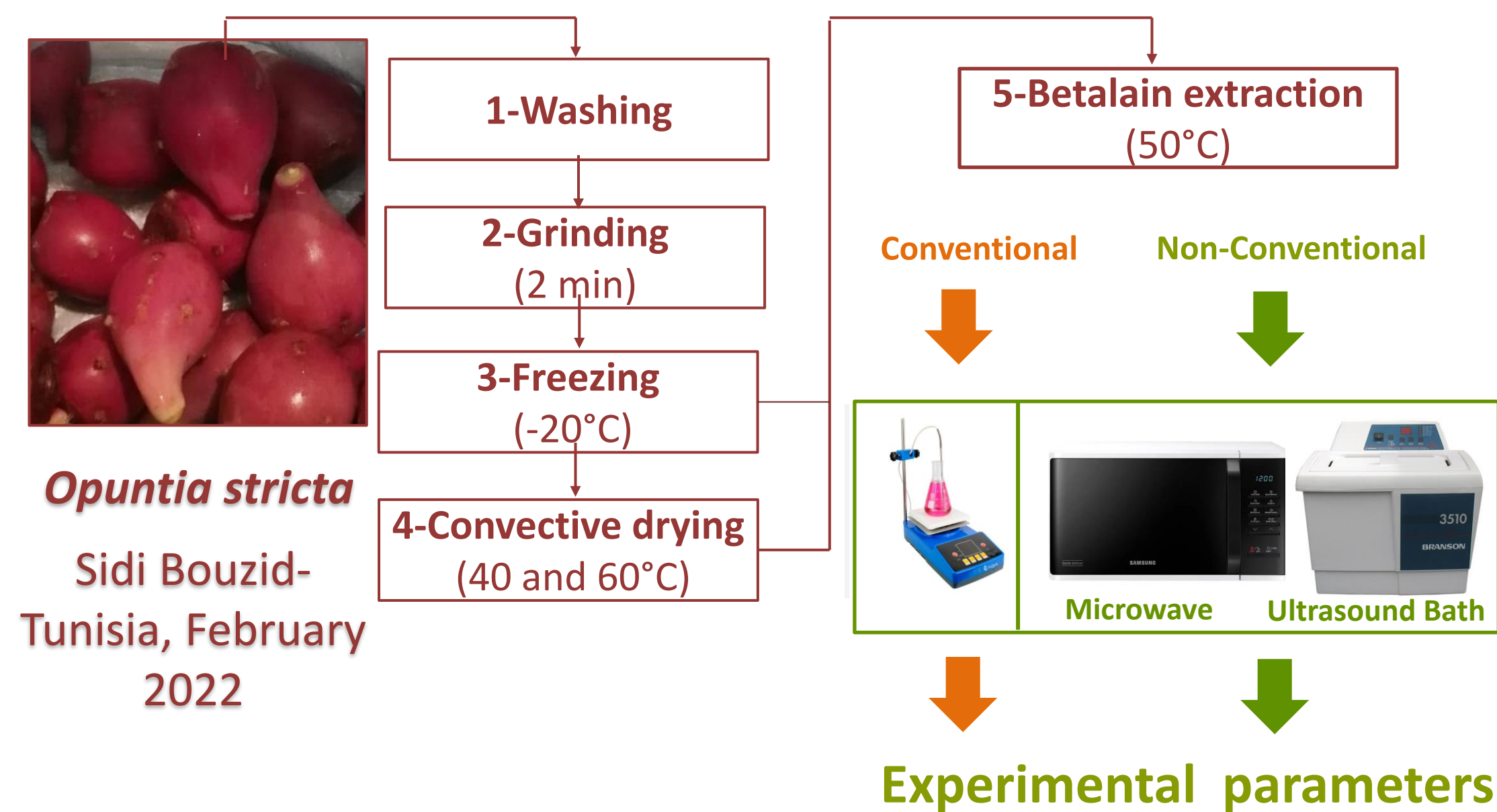
INTRODUCTION & AIM

Opuntia stricta fruit, a Tunisian prickly pear cultivar, was investigated for its betalains as a colorant and health-promoting compound.

This research supports the use of betalains as a natural alternative to synthetic colorants which have been linked to hazardous health and environmental effects. Despite their health benefits, betalains have a high sensitivity to a variety of environmental variables. Thus, preserving the stability of betalain compounds is a crucial step during extraction process.

In this context, this study concerns the betalain extraction process based on conventional and non-conventional approaches. Non-conventional methods involved microwave or ultrasound, either alone or in combination. These techniques have already shown their efficiency in different extraction processes and are considered as environmentally friendly and sustainable. Thus, nine extraction methods are tested and the effects on betalain content, total polyphenol content and antioxidant activity are examined.

METHOD



Betalain content
by Spectrophotometric analysis

Total phenolic content
by Folin-Ciocalteu method

Antioxidant activity
Total ABTS radical scavenging

Extraction methods

Conventional

Conv (20 min)

Non-conventional

Microwave

MW(1min)-MW(2min)

Ultrasound bath US

US(10min)-US(20min)

Microwave/ultrasound

MW(1min)+US(10min)

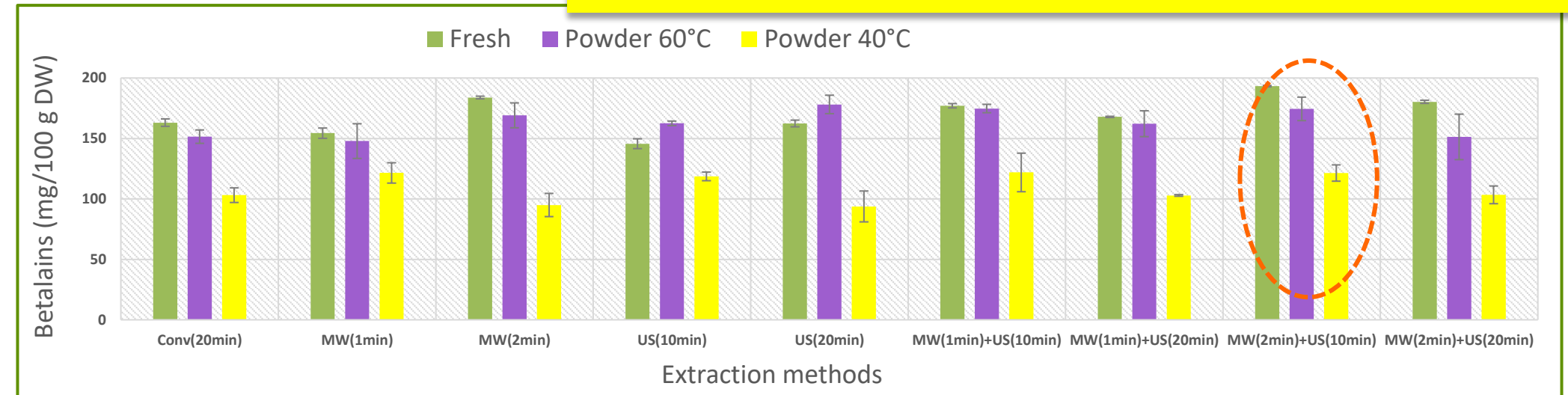
MW(min)+US(20min)

MW(1min)+US(10min)

MW(2min)+US(20min)

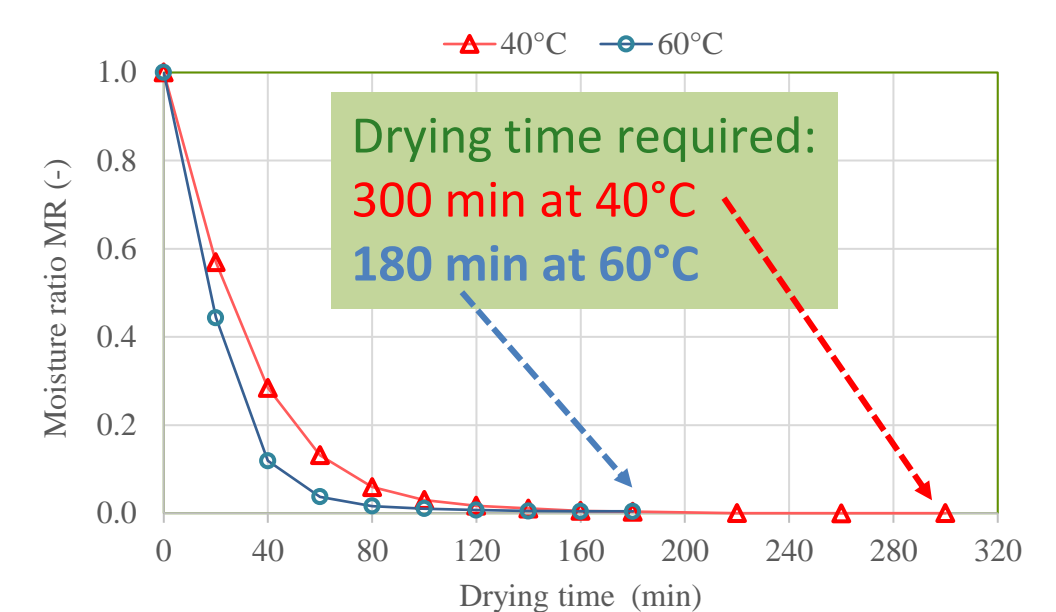
RESULTS & DISCUSSION

Betalains determination in *Opuntia stricta* fruits



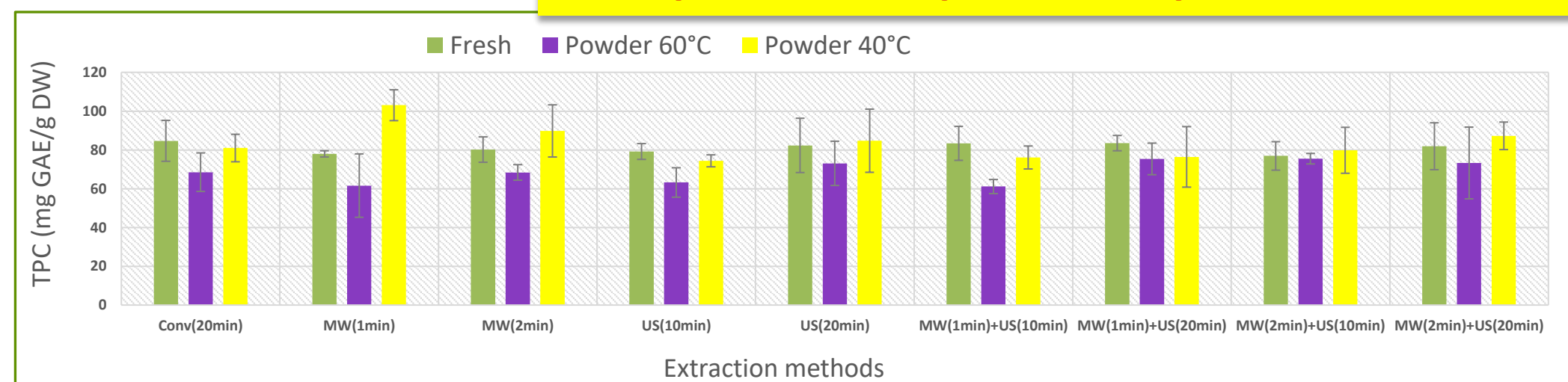
Fresh material presented the highest level of betalain contents in *Opuntia stricta* fruits especially for combined method.

Opuntia stricta powder dried at 40°C unregistered a decrease in betalain content up to 53,75% necessarily affected by long drying duration (300 min).

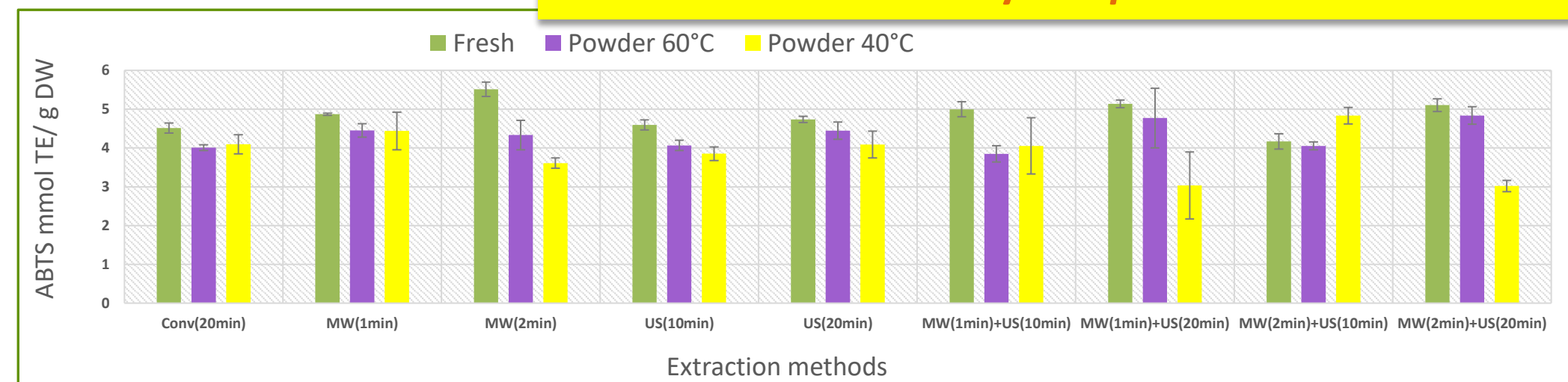


Whatever, dried or not, the non-conventional extraction methods allowed to enhance betalain contents in comparison to conventional extraction.

Total phenolic compounds in *Opuntia stricta* fruits



Antioxidant activity in *Opuntia stricta* fruits



As total phenolic compounds did not display a significant difference between various extraction methods in fresh *Opuntia stricta* fruits, the total ABTS radical scavenging results might be connected with the betalain content variation demonstrating their antioxidant potential.

CONCLUSION

The effect of non-conventional extraction methods on betalain content has been investigated. These green approaches enhance significantly the betalain content of fresh, dried at 40°C and dried at 60°C *Opuntia stricta* fruits by to 18.52%, 18.28% and 17.52%, respectively in comparison to the traditional approaches.

FUTURE WORK / REFERENCES

Beyond the extraction process, more research on betalain's stability is necessary for the better valorisation of *Opuntia stricta* as food additives.