Exploring edible NATIVe Australian and South African plant species for Mediterranean ornamental industry - NATIVASA

Coordinatore UNIMI – Antonio Ferrante

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Società di Ortoflorofrutticoltura Italiana

Exploring edible NATIVe Australian and South African plant species for Mediterranean ornamental industry

Project components two **Research Units**

UNIMI – Coordinator: Antonio Ferrante
SSSA – UR Scientific Responsible: Anna Mensuali

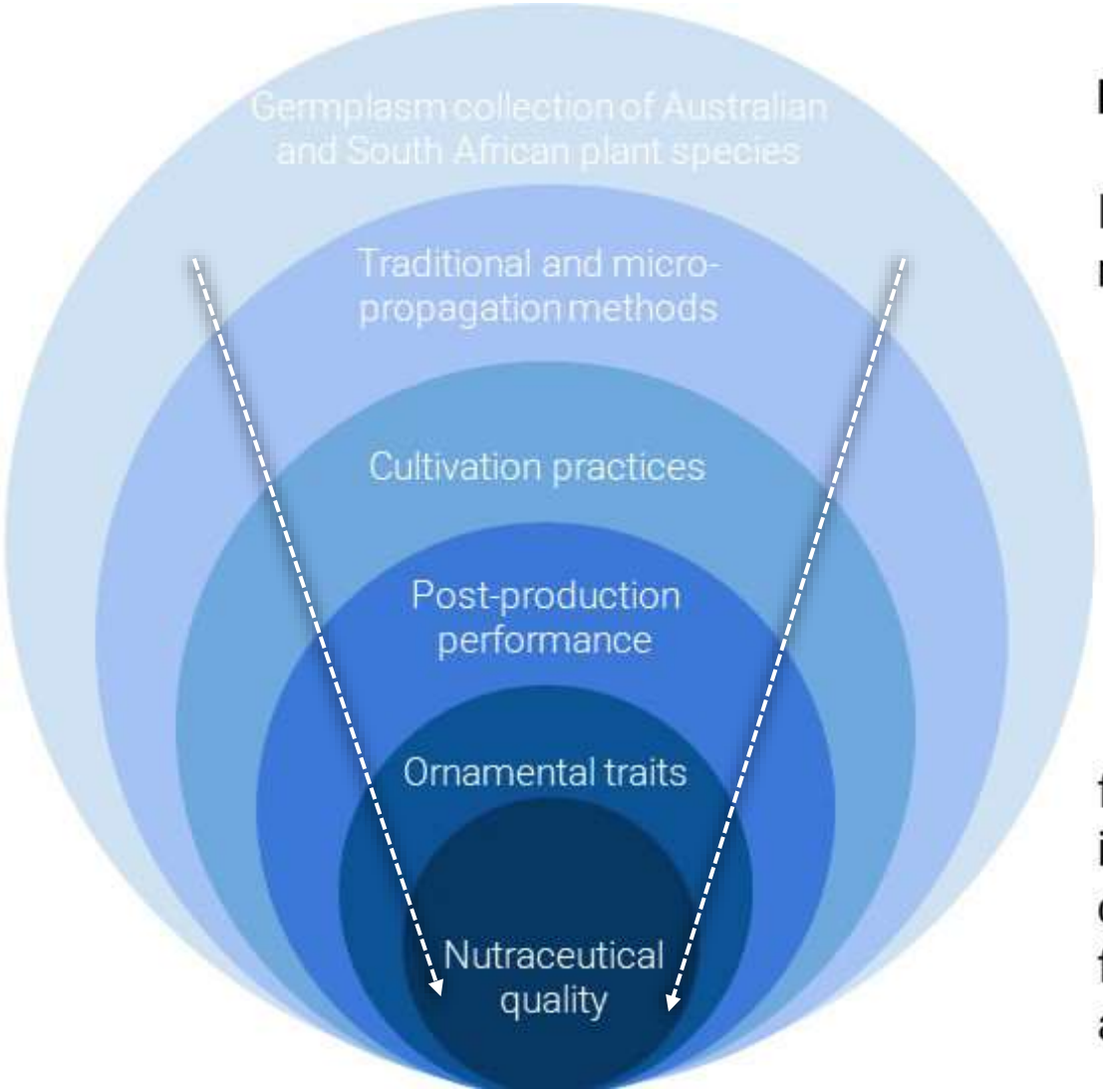
Duration **24 months**: October 2023 – September 2025

Exploring edible NATIVe Australian and South African plant species for Mediterranean ornamental industry

Project objectives:

Many ornamental plants can be used as ornamental or as edible plants with potential benefit on human health.
This project is undertaken to explore (identify) non-traditional, under-used and un-explored **native Australian and South African (ASA)** plant species showing enhanced drought tolerance, novel ornamental value and enriched bioactive phytochemicals fingerprinting for establishment in Mediterranean ornamental industries to reduce the input of water resource during production and to provide profitable new value-added crops for the Italian nursery industry with traits for enhanced sustainability.

Exploring edible and NATIVe Australian and South African plant species for Mediterranean ornamental industry



NATIVASA

Introduction of high-value multifunctional plant species

- easily propagated
- enhanced drought tolerance
- remarkable post-production performance
- high decorative value
- health and nutritional benefits

for a dynamic ornamental industry, resilient to climate change and constantly looking for new products, technologies and market niches.

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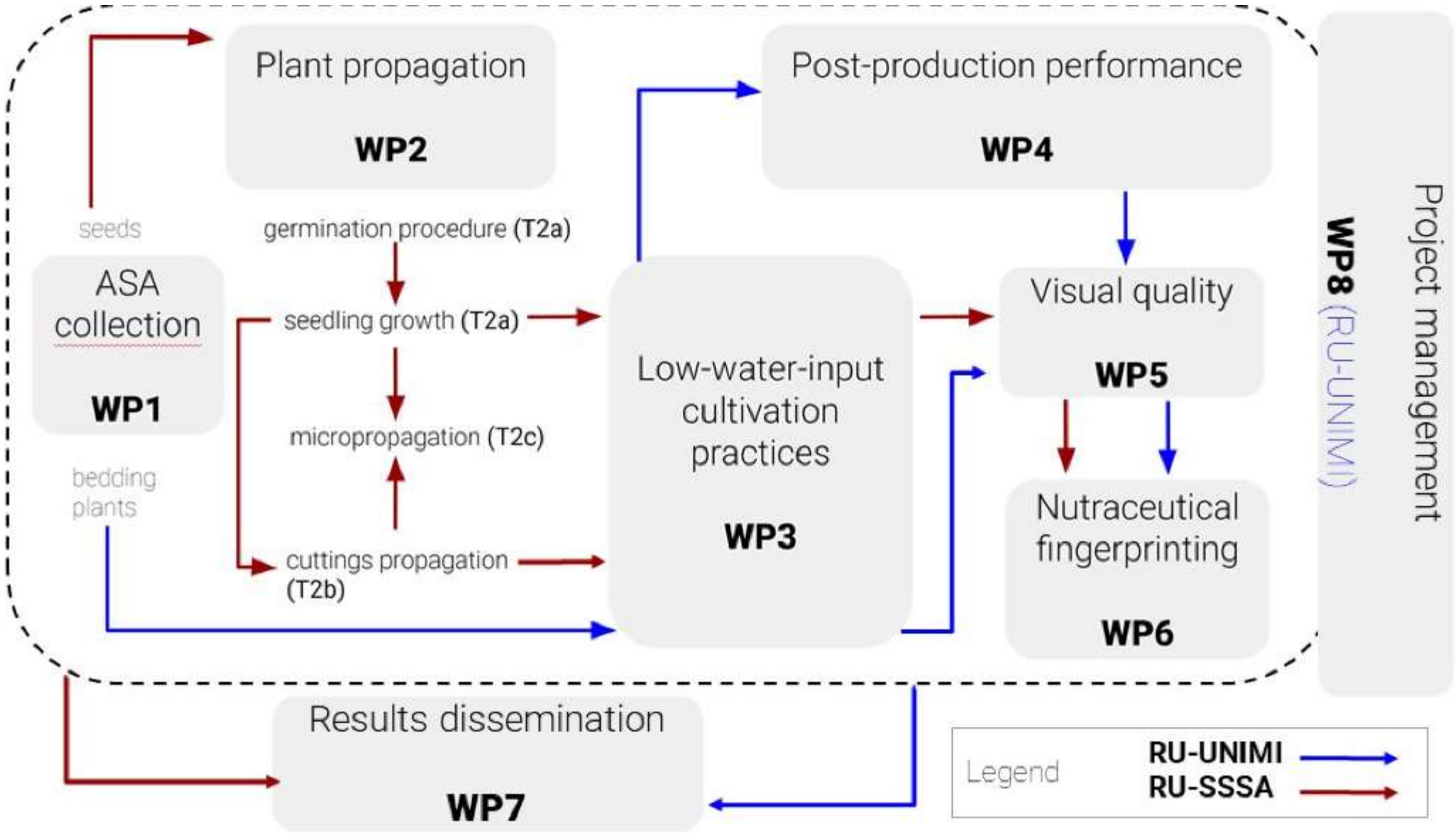

Exploring edible and NATIVe Australian and South African plant species for Mediterranean ornamental industry

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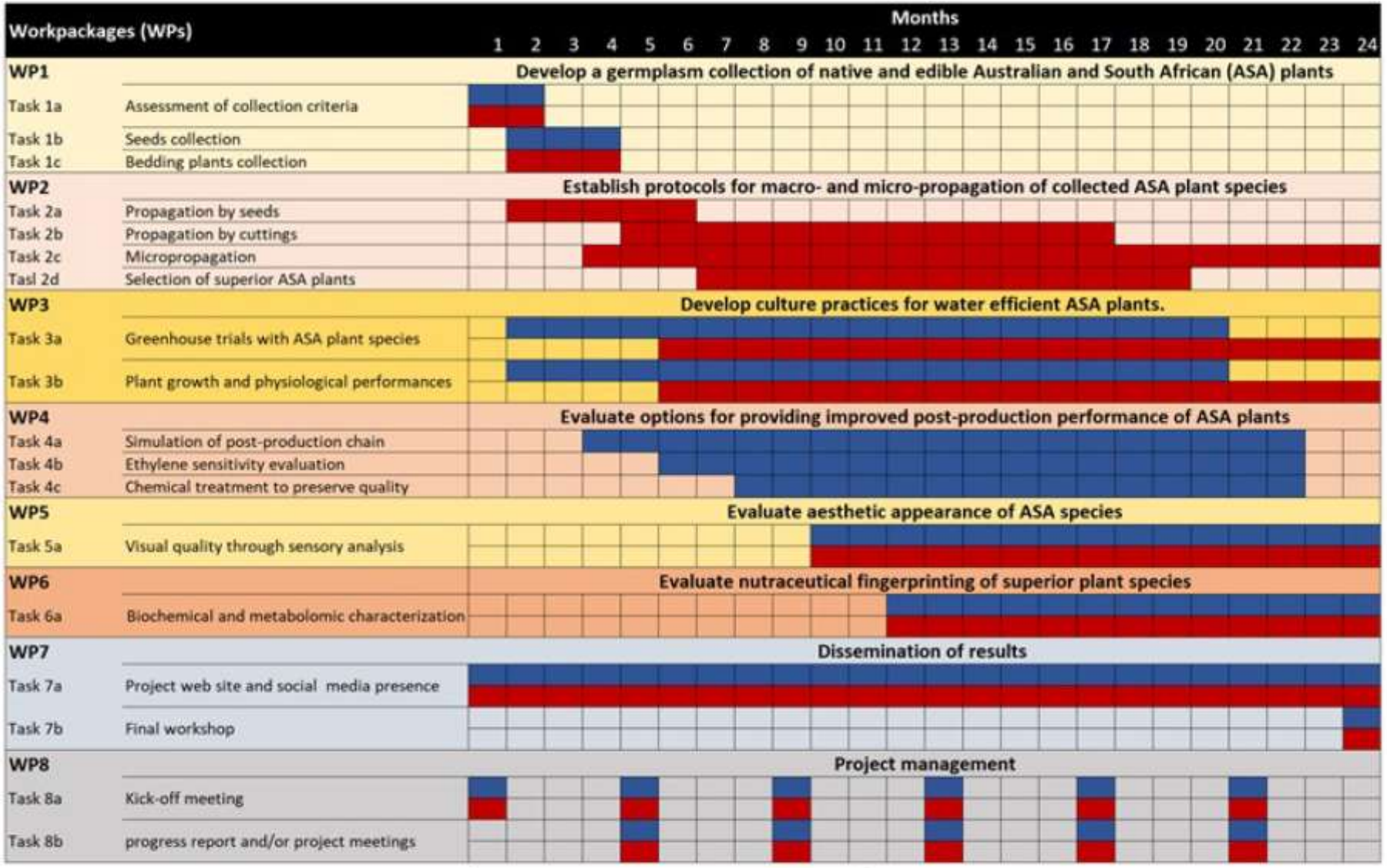


UMINI – SSSA Research activities

WP1 - Develop a germplasm collection of native Australian and South African (ASA) plants

Priority species to be collected will have to satisfy the following criteria:
i) highly adapted to stressful environments such as drought conditions;
ii) potentially have novel ornamental value (i.e. unusual shape/size/color of flowers, leaves and/or fruits);
iii) entire or partial edible;
iv) rich of valuable bioactive phytochemicals;
v) suitable for growing in pots;
vi) have not a predicted invasive potential checked against the Global Invasive Species Database, the noxious weeds lists as well as the DAISIE data base.

WP1

Develop of ASA germplasm collection

WP2

Assessment of collection criteria (T1a)

- tolerance to arid environments,
- presence of novel ornamental trait
- edibility
- rich source of bioactive phytochemicals
- container-grown plant
- absence of invasive potential

Seeds collection (T1b)

bush tucker plants
24 species

What are bush tucker plants?

- Bush tucker, also called bushfood, is any food native to Australia and used as sustenance by Indigenous Australians, the Aboriginal and Torres Strait Islander peoples, but it can also describe any native flora used for culinary or medicinal purposes, regardless of the continent or culture.

- There are many different types of bush tucker foods:
  - Nuts and seeds (eg. Acacia, Macadamia, bunya nuts)
  - Drinks (eg. hot teas, infusions of nectar laden flowers, fruit juices)
  - Flavourings (eg. lemon scented myrtle)
  - Berries (eg. Astroloma, some Solanum species)
  - Fruits (eg. quandong, Ficus macrophylla, Syzygium)
  - Vegetables
  - Wattle seeds ground to produce ‘flour’
  - Plant roots ground to produce a paste or flour.

Why Bush tucker plants?

The more recent interest in bushfood has been generated by the recognition that Australian bushfood provides:

- **Environmental benefits:** highly adapted to arid and salt environments and are expected to tolerate changing climatic conditions easily.
- **Nutritional and medicinal benefits:** they are a powerhouse of nutrition, high in antioxidants, vitamins and minerals.
- **Social benefits:** the adoption of new arid-adapted crops presents a novel approach to creating productive farming enterprises resilient to climate change in Mediterranean's arid region (i.e.: great potential as a new crop for growers)

6	Wattleseed	100	0.76 ± 0.12	ND	17.8 ± 1.2	53.40 ± 7.93	8.14 ± 0.45	61.54
				Fruit				
	Australian Desert Lime	19.6	9.36 ± 0.35	ND	177.8 ± 11.7	197.17 ± 22.56	52.28 ± 0.73	249.45
	Kakadu Plum	12.2	158.57 ± 12.29	ND	4032.5 ± 282.9	1841.97 ± 196.85	669.50 ± 81.15	2511.47
	Lemon Aspen	15.5	10.49 ± 0.34	ND	90.2 ± 15.3	848.70 ± 73.70	343.95 ± 0	1192.65
	Davidsonia pruriens	7.1	48.60 ± 2.48	47.80 ± 1.2	670.7 ± 49.3	982.41 ± 129.30	210.38 ± 2.06	1192.79
	avidsonia jerseyana	5.3	50.25 ± 6.34	98.65 ± 6.5	599.8 ± 20.7	686.24 ± 109.83	214.04 ± 0.64	900.28
	Quandong (dry)	90.1	32.87 ± 2.89	0.53 ± 0.1	454.9 ± 16.8	1987.99 ± 221.50	39.98 ± 1.00	2027.97
	Riberry	8.8	23.62 ± 1.27	35.34 ± 2.5	376.9 ± 21.3	565.91 ± 72.39	251.31 ± 9.73	817.22
	erry (control)	15.0	35.4	38.93 ± 0.99	397.1 ± 20.0	434.6*	2.4*	436.8*

erals identified in selected native Australian herbs, spices and fruits

esented in mg/100g DW with exception of Se and Mo that are presented as µg/100g DW

mple	Zn	Mg	Ca	Fe	Se	P	Na	K	Mn	Cu	Mo	K : Na

bush tucker plants
24 species

Shrub, perennial and rhizomatous herb climbing vine,small hardy perennial sedge, grass

Astroloma serratifolium	Kondrung
Atriplex semibaccata	Creeping / berry saltbush
Billardiera cymosa	Sweet apple berry
Bulbine bulbosa & Bulbine semibarbata	Wild native leek
Capparis lasiantha	Native orange 'nepine'
Cochlospermum fraseri	Kapok bush
Coprosma quadrifida	Prickly currant bush
Dianella caerulea	Blue flax lily
Enchylaena tomentosa	Ruby salt bush
Ficinia nodosa	Knobby club rush
Lomandra hastilis	Mat-rush
Lomandra hystrix	Creek mat rush
Lomandra longifolia	Spiny headed mat rush
Lomandra longifolia Grey Leaf	Grey leaf
Lomandra spicata	Yellow flowered mat rush
Melaleuca brevifolia	Short leaf mallee honey-myrtle
Melaleuca megacephala	Large flowered melaleuca
Myoporum insulare	Native juniper 'boobialla'
Nitraria billardierei	Nitre bush
Petrophile pulchella	Conesticks
Santalum acuminatum	Desert quandong 'native peach'
Solanum lasiophyllum	Flannel bush
Solanum Orbiculatum	Wild tomato
Threlkeldia diffusa	COAST BONEFRUIT 'wallaby saltbush'


Bulbine


Dianella caerulea


Astroloma serratifolium


Atriplex semibaccata

SSSA Research activities

WP2 - Develop protocols for macro- and micro-propagation of selected ASA plant species

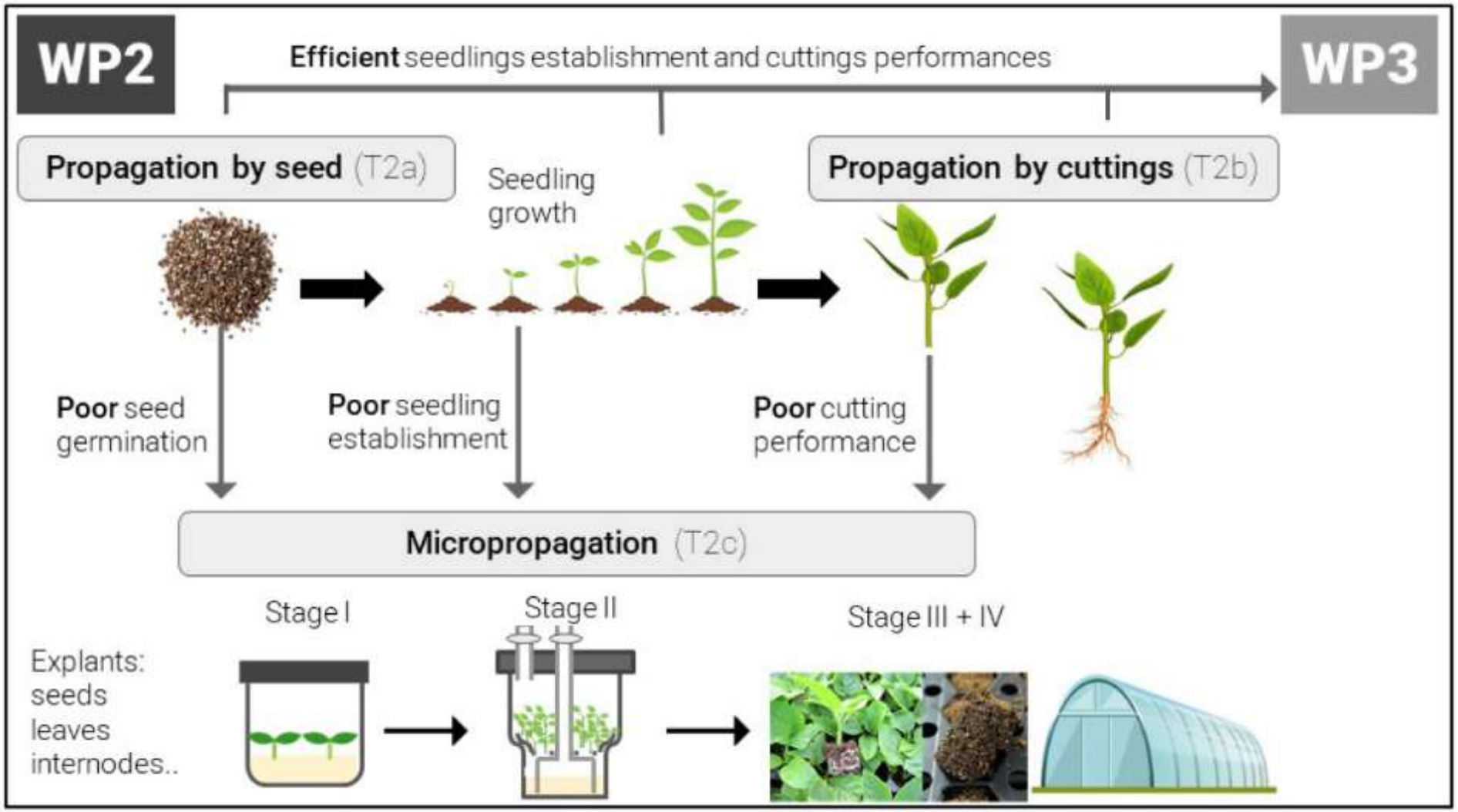


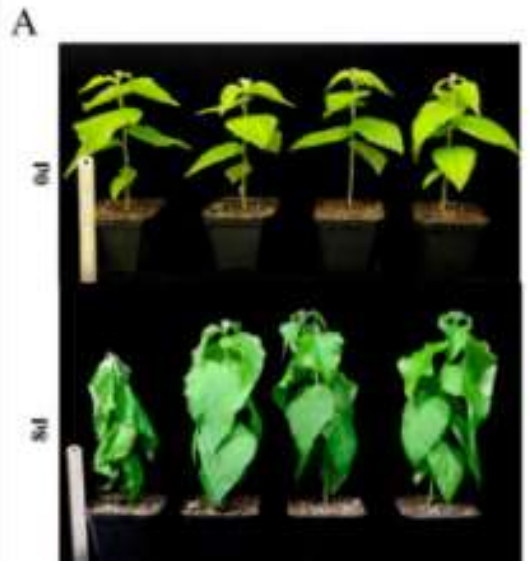
Figure 4: Diagram illustrating the rationale of the WP2

UMINI – SSSA Research activities

WP3 - Develop culture practices for water efficient ASA plants

Task a. Greenhouse trials of plant species obtained from nurseries and seedlings and/or cuttings/*in-vitro* propagated native plants will be conducted to evaluate their tolerance to deficit irrigation (drought).

Task b. Based on plant growth, physiological parameters and visual quality data collected from greenhouse, the irrigation threshold to maintain optimal growth and aesthetic appearance will also be determined for individual plant species.



UMINI Research activities

WP4 - Evaluate options for providing improved post-production performance of ASA plants (for retailer and/or consumer).

Task a. Drought tolerance species will be evaluated in terms of shelf life and plant performance by simulating the post-production chain, from the stages immediately after production to the arrival at the retailers/consumer.

Task b. Since exposure to ethylene during shipping and retailing can reduce the shelf life and performance of ornamental plants a screen for evaluating ethylene sensitivity on these un-explored plant species will be conducted.

Task c. Ethylene inhibitor such as 1-methylcyclopropene (1-MCP) and melatonin, to extend shelf and reduce quality loss during shipping and retailing will be investigated.

UMINI – SSSA Research activities

WP5 - Evaluate the aesthetic appearance of ASA species.

T5a - Description of visual quality through sensory analysis. Through the creation of appropriate descriptors related to the shape/size/color of plant and to its main organs, and the constitution of a jury, ASA plants will be scored for their visual characteristics.

WP6 - Evaluate nutraceutical fingerprinting of superior plant species.

T6a - A fine-tune selection procedure in these potentially health-promoting ASA plants, which includes the characterization of bioactive compounds and nutrients using a biochemical and metabolomic targeted and untargeted approach will be performed to examine the fate of these compounds during cultivation (SSSA), shipping and retailing condition (UNIMI)

UMINI – SSSA Research activities

WP7 - Dissemination of results

T7a - Project website and social media presence, popular scientific platforms, organization of webinars, participation in scientific workshops and conferences, participation/organization in/of as popular events.

T7b - A final workshop will be organized to disseminate final outcomes to national and international scientists, local and national authorities, institutions, associations, and third parties interested in sustainable specialty crops for novel ornamental value and bioactive phytochemicals.

Società di Ortoflorofrutticoltura Italiana

Thank you for your attention

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