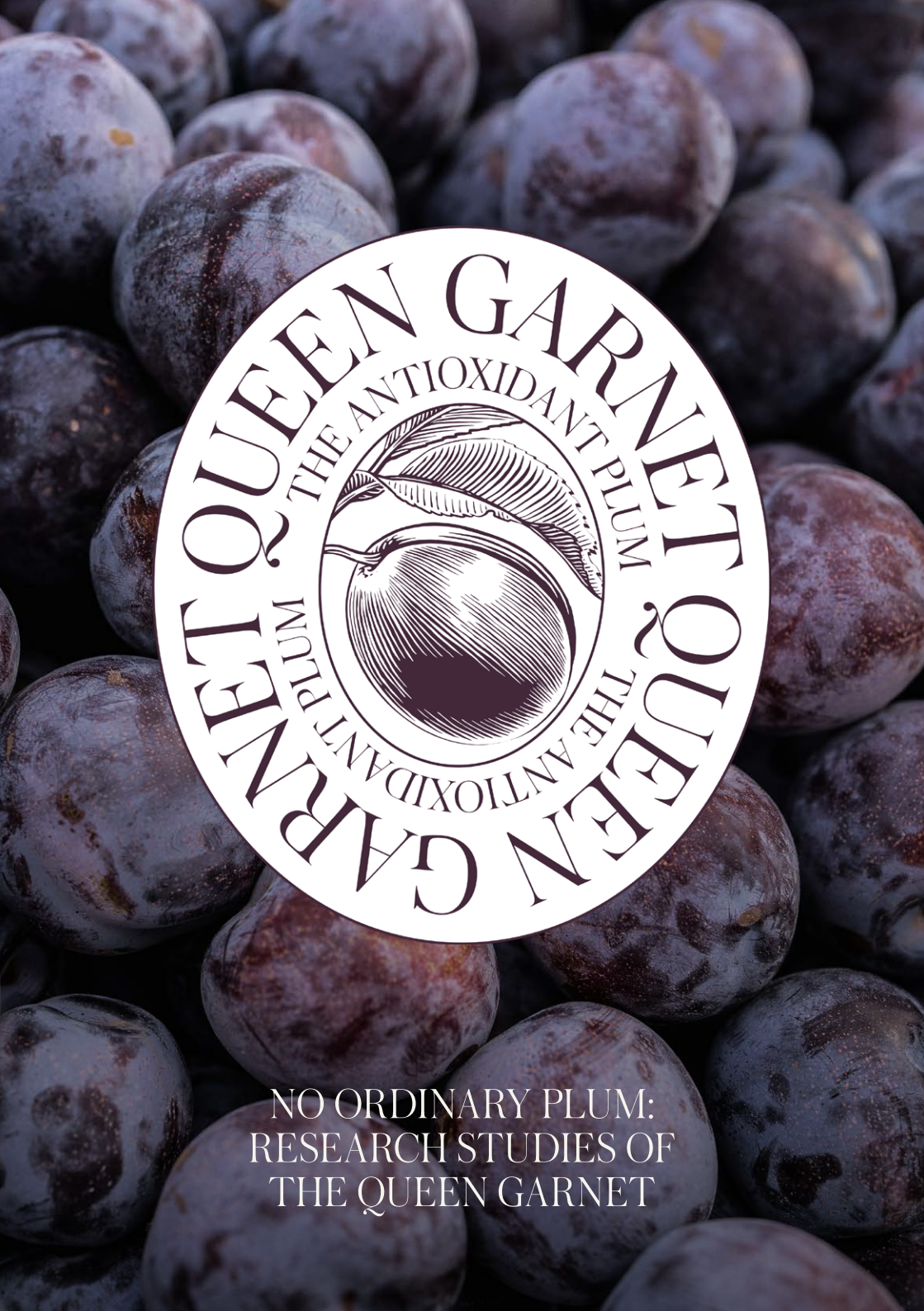


NO ORDINARY PLUM: RESEARCH STUDIES OF THE QUEEN GARNET

THIS IS NO ORDINARY PLUM

The Queen Garnet is a Queensland-owned variety of Japanese plum (*Prunus salicina* Lindl.) that is naturally high in a particular type of antioxidant known as anthocyanin. Cyanidin 3-glucoside is generally found to be the most prominent anthocyanin present in the Queen Garnet.

All fruit is select picked when optimal appearance and feel are reached, in order to deliver the best flavour profile. Growers must be HACCP certified, and are required to provide Nutrafruit with copies of Micro and Chemical (MRL) test results for their fruit to be selected. A food safety audit certificate from a 2nd or 3rd party (SQF, WQA, Freshcare/HARPs etc) is also obtained to ensure produce of the highest quality.

RESEARCH PARTNERS

Inspired by its health benefits, leading Australian universities and scientific organisations are undertaking exciting research to explore the potential of the Queen Garnet plum.

Nutrafruit has not funded any research that has been conducted on the Queen Garnet plum. Research has been studied independently by universities and institutes that are interested in purple fruits and vegetables.

University of Wollongong Australia

University of Southern Queensland

Queensland Government

The University Of Queensland Australia

Victoria University Melbourne Australia

CSIRO

MEET THE QUEEN

Queen Garnet plums boast *antioxidant levels* three to *20 times* that of other plum varieties[1, 2], thanks to their high concentration of anthocyanin. This is a natural antioxidant that gives some plants their rich, vibrant red, blue and deep purple colouring.

RESEARCH FINDINGS

The Queen Garnet has been subject to exciting research studies throughout Australia which will be detailed in this booklet.

Research has demonstrated promising evidence that the Queen Garnet is capable of the following:

- Reversing cardiovascular, liver and metabolic signs of metabolic syndrome[3]
- Lowering blood pressure and improving metabolic and inflammatory parameters in mildly hypertensive obese or overweight subjects[4]
- Reducing blood pressure at 2 hours after consumption[5]
- Improving stool consistency and bleeding, as well as reduced ileum and colon inflammation in rats with inflammatory bowel syndrome[6]
- Improving biomarkers for thrombotic risk[7]

Captured: Professor Lindsay Brown, researcher at the University of Southern Queensland

METABOLIC SYNDROME

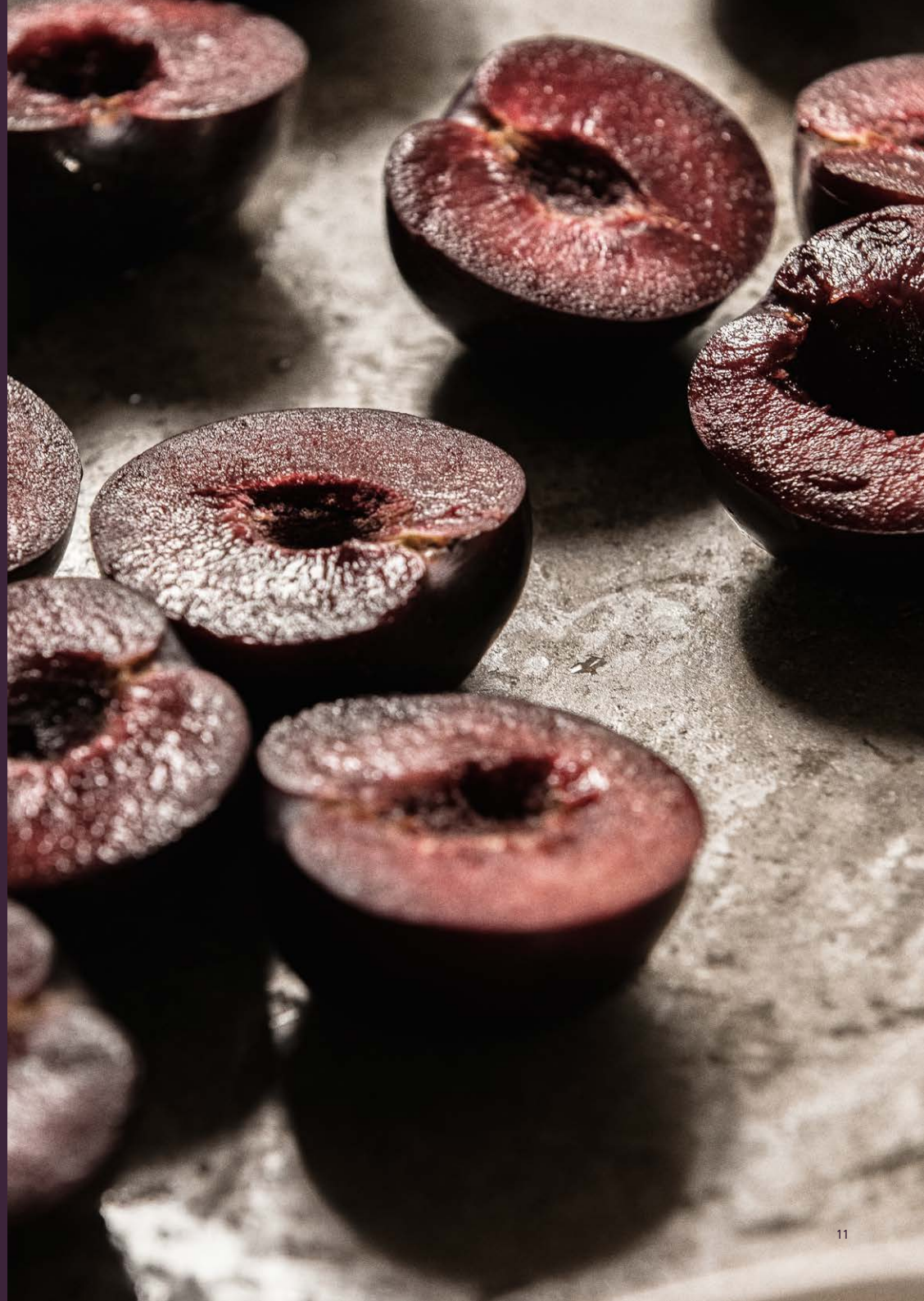
THE EFFECT OF QUEEN GARNET ON DIET-INDUCED METABOLIC SYNDROME IN RATS[3]

> The Queen Garnet reversed cardiovascular, liver and metabolic signs of metabolic syndrome.

72 rats were randomly divided into different interventions for a 16 week study. For the first 8 weeks, half of the rats were fed a corn starch diet and half were fed a high-fat/high-carbohydrate diet. For the last 8 weeks, some rats received the Queen Garnet plum in addition to their previous diet.

The Queen Garnet had the following effects on rats consuming the high-fat/high-carbohydrate diet:

- *Hormones*: normalisation of leptin concentrations
- *Glucose metabolism:* decrease in fasting blood glucose concentrations and plasma glucose concentrations; plasma insulin concentrations almost half those of rats that were not treated with Queen Garnet
- *Cardiovascular effects:* normalisation of diastolic stiffness, systolic and diastolic volumes, cardiac output, and systolic wall stress; suppressed infiltration of inflammatory cells in the left ventricle; reduced collagen deposition, and improved contraction and relaxation of aorta
- *Plasma lipid profile*: reduced plasma concentrations of total cholesterol, triglycerides and NEFA
- *Liver*: lower liver wet weight and plasma ALT, AST and ALP activities compared to rats not treated with Queen Garnet, as well as decreased inflammatory cell infiltration
- *Weight*: lower total mass and lower abdominal circumference



METABOLIC SYNDROME CONT.

THE EFFECT OF QUEEN GARNET ON MILDLY HYPERTENSIVE OBESE OR OVERWEIGHT SUBJECTS[4]

> Researchers found that the Queen Garnet is as effective as standard hypertensive drugs for lowering blood pressure and improving metabolic and inflammatory parameters in this population.

29 human volunteers (15 males, 14 females, aged between 20 and 60 years) participated in a randomized, double-blinded, placebo-controlled trial. Volunteers were either overweight or obese and had high-normal or mild hypertension with no medication or weight loss supplements. Participants were told that the trial was investigating the health effects of two different fruit drinks and that they would be required to drink 250 ml every morning for 12 weeks.

The Queen Garnet intevention resulted in the following effects:

- *Cardiovascular*: significant decrease in systolic and diastolic blood pressure with QG treatment
- *Plasma lipid profile*: decreased fasting plasma LDL, glucose, insulin, and C-peptide concentrations. Compared to the raspberry cordial group, the QG group had decreased leptin and increased adiponectin concentrations, decreased fasting plasma interleukins, and decreased TNF-alpha

BLOOD PRESSURE

THE EFFECT OF QUEEN GARNET ON AMBULATORY BLOOD PRESSURE[5]

> A significant reduction in blood pressure and cardiovascular responses was observed.

24 participants (12 young 18-45 year olds and 12 older 65+ year olds) attended two 6-hour clinic visits. Upon arrival in the morning after fasting for 12 hours, participants were fitted with an ambulatory blood pressure monitor for blood pressure monitoring over 24 hours (every 15 minutes at the clinic and then once every hour while at home afterwards). Low-flavonoid breakfast cereal was provided with Queen Garnet plum juice (either single dose 300 ml or 3 x 100 ml over 3 hours).

The Queen Garnet had the following effects:

- Blood pressure reduced significantly at 2 hours after consumption for both groups, evidencing the absorption and bioavailability of the anthocyanin and metabolites that occur within 2 hours post-consumption
- A significant reduction in blood pressure was observed in both age groups. This was more obvious in the older age group on the single dose for systolic blood pressure, diastolic blood pressure, mean arterial pressure, and heart rate
- No observed significant dose-timing effect as a result of Queen Garnet consumption

INFLAMMATORY BOWEL DISEASE

THE EFFECT OF QUEEN GARNET ON DSS-INDUCED INFLAMMATORY BOWEL DISEASE IN RATS[6]

> Rats showed improved stool consistency and bleeding, as well as reduced ileum and colon inflammation.

64 rats were randomly divided into different interventions for a 12 week study. For the first 6 weeks, half of the rats were fed either normal water or 0.5% dextran sodium sulphate to induce inflammatory bowel disease. For the final 6 weeks, some rats received Queen Garnet plum in addition to their previous diet.

Compared to the DSS group with no source of anthocyanin, the QG-treated rats had the following:

- Regeneration of crypt and epithelial membrane
- Fewer inflammatory cells
- Decreased scores* in stool consistency (0-formed to 3-watery/diarrhoea) and stool bleeding (0-normal colour to 3-bloody red)
- Lower histological score of the ileum and colon

*This score was calculated as the sum of degree of inflammation (0-absent to 3-severe), the sum of degree of inflammation (0-absent to 3-severe), extent of inflammation (0-absent to 3-transmural, occurring across entire wall of organ or vessel), crypt and epithelial damage (0-absent to 4-severe), and tissue regeneration (0-regenerated or normal to 4-no repair)

THROMBOGENESIS

THE EFFECT OF QUEEN GARNET ON PLATELET ACTIVATION RELATED THROMBOGENESIS[7]

> The Queen Garnet significantly improved biomarkers for thrombotic risk in this randomised, double blind, placebo-controlled, cross-over trial.

21 healthy participants with no history of metabolic or cardiovascular diseases randomly divided into 3 groups: 200 mL/day of Queen Garnet plum juice, prune juice, or colour matched placebo drink for 28 days followed by a 2 week wash-out period, with measurements taken at baseline and on day 29. Following this, supplementation cross-overs were performed following this methodology.

The Queen Garnet improved the following biomarkers for thrombotic risk:

- Inhibited platelet aggregation induced by ADP, collagen and arachidonic acid
- Reduced P-selectin activation-dependent surface marker expression
- Decreased plasma MDA (a biomarker for lipid peroxidation) content by 38%
- Reduced fibrinogen concentration

APPENDIX

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