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GI News is published online every month by the University of Sydney, School of Life and Environmental Sciences and the Charles Perkins Centre, and delivered to the mailboxes of our 97,000 subscribers. Our goal is to help people choose the high-quality carbs that are digested at a rate that our bodies can comfortably accommodate and to share the latest scientific findings on food and diet with a particular focus on carbohydrates, dietary fibres, blood glucose and the glycemic index.

Publisher: Professor Jennie Brand-Miller, PhD, AM, FAA, FAIFST, FNSA
Editor: Philippa Sandall
Scientific Editor/Managing Editor: Alan Barclay, PhD, APD, AN
Social Media: Natasha Williams
Contact: ginewsfeedback@gmail.com
Join us on:

Sydney University Glycemic Index Research Service
Manager: Fiona Atkinson, PhD, APD, AN
Contact: sugirs.manager@sydney.edu.au

FOOD FOR THOUGHT

FIVE THINGS YOU SHOULD KNOW ABOUT PROCESSED FOODS

These days, processed food seems to be associated with either "junk food" or food additives – things that many people would rather avoid if they could. Prof Jennie Brand-Miller reminds us that food processing is nothing new. It's something our paleolithic (stone age) ancestors were doing long before the agricultural revolution some 12,000 years ago. Just imagine all the trial and error that went into discovering how to leach toxins from plant foods. Perhaps, we should see food processing as an example of human creativity at its best she suggests.

FOOD PROCESSING IS NOTHING NEW

Stone-grinding of seeds and leaching of toxins from plant foods have been practised for thousands of years. Many fruits dried naturally on the bush or tree (think dates, figs and sultanas) making them 'shelf stable' for years. We know that Australia's Indigenous people for example collected one particular variety in large quantities, mashed and shaped them into a ball and placed them high up in a tree to protect them from animals. These energy-dense snacks were a safe and reliable treat during the following season. In "Transforming the Inedible into the Edible," Anna Teuchler, Asa Ferrier and Richard Cosgrove describe how the Indigenous people in far northeast Queensland leached the toxins from rainforest tree nuts, a dietary staple, several thousand years ago (see Read More).

IT EXTENDS SHELF LIFE

Anyone who farms even on a small scale in their backyard knows that fruit and vegetables are seasonal. They ripen in gluts and we give half away. But being the creative creatures that we are, we developed ways to extend the storage life of most foods. Sun drying of fruit, fish and seaweeds, pickling of vegetables in vinegar and brine and salting of meat, were early processing techniques. We also learned that nitrate salts added to meat gave them not only longer storage life, but a nice pink colour and delicious flavour as well. Hams, bacon and salami are still on the menu made using age-old techniques of processing.

IT KILLS BACTERIA

In time, we learned to bottle fruit and vegetables, cooking them first, sealing them carefully and raising the temperature as high as possible to kill bacteria and fungi that would inevitably contaminate fresh food. Eventually, the food industry took over from the homemaker, developing more reliable sterilisation techniques that prevented the growth of botulinum spores. Botulism was a dreaded phenomenon – just a single lick of the finger was enough to poison violently and often kill.

IT HELPS US AVOID WASTE

The chemical and physical processes that are used by the food industry are more often than not identical to those we use in the kitchen – heating, toasting, blanching, boiling and freezing, just on a much larger and more efficient scale. Without modern methods of processing that permit long-term storage, we would otherwise waste a huge proportion of any seasonal harvest. The excess food would be thrown away, causing surges in pests like locusts, mice and rats and creating smelly streets full of vermin and garbage. And food scarcity, vitamin deficiency and even death in winter and spring were not uncommon.

IT EXPANDS OUR DIETARY CHOICES

Finally, where would we be without the creativity of those early farmers who milled wheat and other grains into flours to make delicious breads, cakes and biscuits? Dairy farming also made use of lactating cows (and goats, sheep and camels), who were capable of producing more than enough milk for their offspring. This highly nutritious product gave rise through natural selection to whole populations with the ability to digest lactose, the sugar in milk. And it wasn't long before early farmers processed excess milk into forms that could be stored and accessed in times of scarcity (think cheese and other fermented dairy products), even by those with lactose intolerance. How dull our diet would be without yogurt, feta, parmesan and the hundreds of other soft and hard cheeses we enjoy throughout the year.

WHAT ABOUT ADDITIVES?

In Australia, we have a relatively short list of permitted food additives that are governed by strict food laws. They are permitted in specific foods in specific quantities (not any food, nor any quantity). They must serve a technological need and must have been assessed for

safety in much the same way as all drugs. Like sun drying, a preservative lengthens the shelf life of a food. The majority of food additives are identical to substances that occur in nature and serve the same purpose (e.g. lecithin in eggs is an emulsifier than keeps water and fats in a stable emulsion). Only flavours consisting of thousands of molecules have not been through the rigorous testing of other food additives. The same applies to the natural flavours we leverage in herbs and spices.

Read More:

- Transforming the inedible to the edible: An analysis of the nutritional returns from Aboriginal nut processing in Queensland's Wet Tropics

WHAT'S NEW?
PLANT PROTEIN LINKED TO LONGER LIFE
Greater consumption of plant-based proteins such as those found in cereals and legumes is associated with lower mortality risk, according to an observational study in *JAMA Internal Medicine*. Roughly 70,000 people aged 40 to 69 in Japan completed food frequency questionnaires. During a mean 18 years' follow-up, 18% died.

Intake of plant protein was associated with lower total mortality. A similar pattern was seen for cardiovascular (e.g., heart disease and stroke) mortality, but not cancer-related mortality. In contrast, increasing intake of total or animal-based protein was not associated with mortality.

Swapping out 3% of energy from animal protein with plant protein resulted in lower risk for total, cardiovascular, and cancer-related mortality. Risk reductions were even greater when substituting plants for processed meats. The lack of an association between animal protein and mortality might be because animal consumption is generally lower in Japan than in the U.S., and the main animal protein is fish say the authors. They conclude: "Our study suggests that encouraging diets with higher plant-based protein intake may contribute to long-term health and longevity."

Protein is widely available in our food supply. And while people talk about "protein foods", no food is all protein and most of us eat a variety of foods containing many different proteins. As Dr David Katz says: "Dietary protein does not require animal foods, and does not require any specific food combinations. Wholesome foods in any balanced, sensible assembly – even a strictly vegan assembly – will readily provide it."
Plant sources:

- Beans, chickpeas or lentils (legumes/pulses)
- Nuts and seeds
- Grains, especially whole grains
- Starchy veggies (potato, sweet potato etc.)

Animal sources:

- Meat, poultry, and seafood
- Eggs
- Milk, cheese and yoghurt.

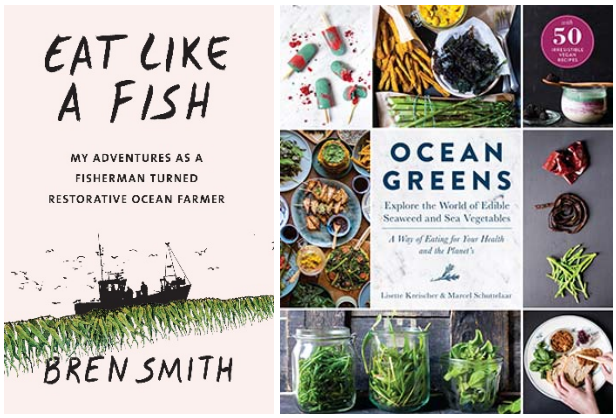
Read more

- Association of animal and plant protein intake with all-cause and cause-specific mortality

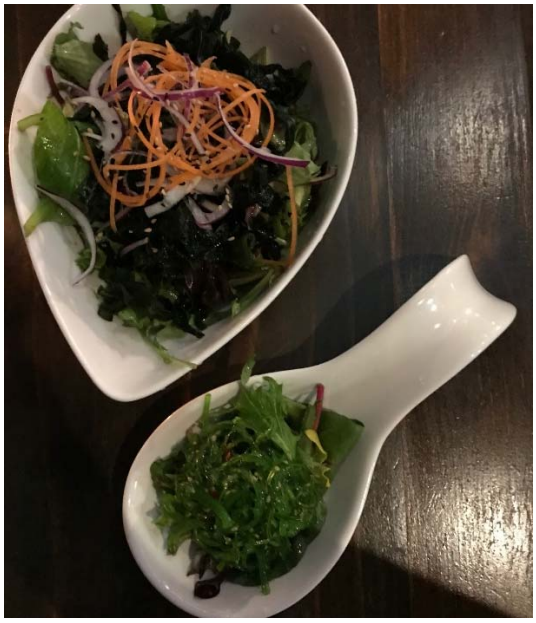
PRODUCT REVIEW

FIVE THINGS YOU NEED TO KNOW ABOUT EDIBLE SEAWEEDS

Two books about edible seaweeds recently arrived on the editor's desk. *Ocean Greens* by Lisette Kreischer and Marcel Schuttelaar (The Experiment) explores the world of edible seaweed and sea vegetables and includes 50 vegan recipes. Bren Smith's *Eat Like a Fish* (Murdoch Books) is more of a rollicking tale of the adventures of a fisherman turned restorative ocean farmer growing edible algae. They have inspired us to take a closer look at these "vegetables" that are used as ingredients and flavourings in sauces, soups, salads, stews and side dishes and as sources of food additives such as carrageen (a thickener), and agar agar (a gelling agent).



WHAT ARE EDIBLE SEAWEEDS? They are marine algae. There are more than 20,000 species of algae and humans have enjoyed hundreds of them for thousands of years. They have been especially important foods through coastal Asia, in the British Isles, and places as different as Iceland and Hawaii says Harold McGee in *On Food and Cooking*. There are three broad groups: green, red and brown.



WHAT'S IN SEAWEED? Seaweeds absorb nutrients from water. Fresh seaweed is around 70–90% water, 6% protein and 5% carbohydrates (including dietary fibre) and has negligible fat. They are rich sources of some vitamins and minerals. Importantly, they are a good source of iodine, a naturally occurring mineral that is needed by the thyroid gland to synthesize thyroxine, an important hormone that regulates metabolism. They also can absorb toxic metals so they are regularly monitored by Food Standards organisations.

HOW DO YOU PREPARE THEM? Some seaweeds can be eaten raw; others are better cooked, dried, baked or roasted. Here's what Lisette Kreischer and Marcel Schuttelaar recommend:

- Fresh seaweed: rinse thoroughly, then gently squeeze out any excess water and pat dry with paper towels.
- Dried seaweed: Soak following the packet instructions. It expands considerably when rehydrated. For example, 5g dried wakame equals 40–50g fresh.

Good Carbs Cookbook author, Kate McGhie, recalls her Mum and Nan often used seaweed as a substitute for lettuce or spinach in salads. They combined it with crisp chopped apple, golden shallots and sometimes shredded cabbage and nuts for contrast all tossed in a tangy dressing.

Yotam Ottolenghi is a seaweed fan. "Sea lettuce and aonori (green laver) are the most widely used of the green group – sea lettuce in salads and soups, aonori in powdered form," he says. "Red algae, meanwhile, tend to have a deeper, sulphur-like aroma. Nori, the most common of these, is the traditional sushi wrapper, while dulse – a purplish leaf that turns green when cooked – develops a distinct aroma of bacon when fried. The generally milder brown algae include in their number kelp, kombu (essential in dashi) and wakame, the vibrant green leaves in miso soup and in salads."

HOW MUCH SEAWEED SHOULD YOU EAT? The authors of *Ocean Greens*, Lisette Kreischer and Marcel Schuttelaar, recommend consuming edible seaweeds in moderation as part of a diverse and well-balanced diet. They suggest around 5–10g dried seaweed a day is plenty.

WHAT SEAWEED IS THAT? It's easy to get confused as there can be numerous common names for the same product. We have put together this simple guide for GI News readers.

Brown algae

The main uses of brown seaweeds are as foods and sources for alginates.

Food/ingredient (common names)	**Botanical name**
Arame	*Eisenia bicyclis*
Badderlocks (dabberlocks, winged kelp, American wakame)	*Alaria esculenta*
Bladder wrack, black tang, rockweed, bladder focus, sea oak, black tany cut weed, dyers focus, red focus, rock wrack)	*Fucus vesiculosus*
Hijiki (hiziki, deer tail grass, sheep nest grass, horsetail tangle)	*Sargassum fusiforme*
Kombu	*Saccharina japonica*
Oarweed	*Laminaria digitata*
Sea spaghetti (thongweed)	*Himanthalia elongata*
Sugar kelp (devil's apron, sweet kombu)	*Saccharina latissima*
Wakame	*Undaria pinnatifida*

Red algae

The main uses of red seaweeds are as foods and sources for agar and carrageen.

Food/ingredient (common names)	**Botanical name**
Dulse	*Palmaria palmata*
Gim (kim)	*Pyropia, Porphyra*
Graceful redweed	*Gracilaria tikrahiae*
Irish moss	*Chondrus crispus*
Laverbread	*Porphyria laciniate / P. umbilicalis*
Nori (purple seaweed, purple laver)	*Fucus vesiculosus*
Ogonori (red ogo)	*Gracilaria edulis; G. corticata*

Green algae

The main uses of green seaweeds are as foods.

Food/ingredient (common names)	**Botanical name**
Sea lettuce	*Ulva lactuca*

Read more:

- *Ocean Greens* (The Experiment)
- *Eat Like a Fish* (Murdoch Books)
- Dr Alan Barclay: Iodine and the thyroid gland

- Photo: Wakame Salad and Seafood Salad (Sake Street, Bondi Beach)

PERSPECTIVES: DR ALAN BARCLAY.
FOOD SAFETY: A VITAL INGREDIENT FOR LONGEVITY
While we tend to focus on the importance of eating healthy foods, meals and diets for longevity, and for the prevention of lifestyle-related diseases like certain kinds of cancer (e.g., bowel), diabetes (type 2), heart disease and stroke, food safety is an extremely important issue that is often overlooked.

FOODBORNE ILLNESS This is a significant cause of acute illness and even death in developed nations like Australia (an estimated 5.4 million cases of food poisoning each year), Canada (estimated 4 million cases each year) and the USA (estimated 48 million cases each year) and unfortunately it appears to be increasing worldwide. Foodborne illness is caused by contaminated foods and drinks. Common contaminants include:

- Pathogens – unwanted bacteria, moulds and viruses in foods and beverages
- Environmental contaminants – heavy metals (e.g., lead, mercury, cadmium, etc.) and organic halogenated compounds (e.g., DDT, polychlorinated biphenols, dioxins, etc.); pesticides (plant-foods) and veterinary drugs (animal-foods); contaminants formed during food production and cooking (e.g., acrylamide); contaminants arising from food packaging (e.g., bisphenol A (BPA), or natural toxins in food (e.g., aflatoxins in maize and peanuts)
- Adulterants – the deliberate debasing of the quality of a food or beverage by the admixture or substitution (e.g., sand, marble chips, stones, chalk powder) of inferior substances/ingredients into common foods (e.g., flours, legumes, milk, coffee, etc.).

Around 60–80% of foodborne illnesses are due to problems that occur during growing, processing, distributing or selling foods and beverages. Food producers, manufacturers, retailers, restaurants and other distributors are ultimately responsible for ensuring that the food we buy is safe, and Government food regulators are responsible for setting standards (e.g. regulating pesticide and antibiotic use; permitted contaminant levels, etc.), providing oversight (e.g., site inspection, market basket surveys/audits, coordinating recalls, etc.) and ultimately penalising offending companies.

When foods or beverages are found to be contaminated, food recall action is taken by a food business to remove unsafe food from distribution, sale and consumption. All food businesses must be able to quickly remove food from the marketplace to protect public health and safety. It may surprise you to learn that food businesses initiate most recalls. However, Government food authorities usually coordinate and monitor the recall process.

In Australia and other developed nations, foods prepared in the home account for 20–40% of foodborne illness. The main causes of foodborne illness at home are:

- Contaminated food storage and preparation areas
- Unsafe raw food
- Inadequate cooking
- Improper holding temperatures
- Contaminated equipment (such as knives, cutting boards and dishcloths)
- Allowing raw foods to make direct contact with ready-to-eat foods

- Poor personal hygiene of food handlers (such as not washing hands adequately, particularly after handling raw food or immediately after using the bathroom/toilet).

Foods that are considered higher risk because pathogens can be naturally present and grow if they are not stored and prepared safely, include:

- Raw and cooked meat or foods containing raw or cooked meat
- Seafood and foods containing seafood
- Dairy products and foods containing dairy products
- Processed foods containing eggs or other protein-rich food
- Cooked rice and pasta
- Processed fruit and vegetables such as salads
- Foods that contain any of the above foods (e.g. sandwiches).

Always check use by dates, avoid cross-contamination, cook foods adequately and store them at safe temperatures, and check the foods for unpleasant odours before eating or drinking.

FOOD POISONING? If you have food poisoning, you'll probably have gastro-intestinal symptoms such as abdominal cramps, diarrhoea or vomiting, or flu-like symptoms. You should always seek medical advice if you're in a high-risk group (infants, elderly, pregnant or breast-feeding women or immune-compromised) or have any of the following symptoms:

- Frequent vomiting
- Bloody vomit or stools
- Diarrhoea for more than three days in a row
- Extremely painful abdominal cramping
- A temperature higher than 38.6°C (101.5°F)
- Dehydration from repeated vomiting or diarrhoea
- Blurry vision, muscle weakness or tingling in the arms.

TREATMENT: For a mild case of food poisoning, you may try sucking ice chips, replenishing fluids and electrolytes when you're ready and easing back into your normal diet and routine. For more serious cases, see your doctor. Don't forget to contact your local food enforcement agencies and report the illness to help prevent others from getting it.

Read more:

- Australian Dietary Guidelines: Guideline 5 – food safety
- Food Standards Australia New Zealand – Food recalls

- Is it food poisoning?

Alan Barclay PhD is a consultant dietitian. He is author of Reversing Diabetes (Murdoch Books), and co-author of 30-plus scientific publications, The Good Carbs Cookbook (Murdoch Books), Managing Type 2 Diabetes (Hachette Australia) and The Ultimate Guide to Sugars and Sweeteners (The Experiment Publishing). Follow him on Twitter or check out his website.

GOOD CARBS FOOD FACTS
WILD RICE

A distant cousin of regular rice, wild rice (*Zinzania palustris*) is a cool climate water grass that traditionally grew in shallow lakes and marshes in the Great Lakes area and upper Minnesota (it's Minnesota's official state grain). For at least 2500 years, Native Americans harvested its seeds in canoes powered by long poles, using beater sticks to knock the ripe seeds into the bottom of their canoes. Most wild rice these days is cultivated and grown in paddies in California. However, you can still buy "wild" wild rice. For example, uncultivated Minnesota wild rice must by law be harvested in the traditional Native American way, and only by those licensed to do so. In Read More, we list where you can buy it online.

Wild rice has a firm, chewy texture and nutty flavour and is a good source of fiber, folate, magnesium, phosphorus, manganese, zinc, Vitamin B6, and niacin. It takes longer to cook than regular rice – up to 50 minutes. One cup of uncooked wild rice yields 3–4 cups cooked. You can also pop wild rice, like popcorn. Just heat it in a little oil and shake until it pops.

Good Carbs Food Facts **Wild rice**	
★ ★ ★ ★	
Glycemic index 57	
Gluten free	
Serving size – ½ cup cooked wild rice (about 70g/2 ½ oz)	
Kilojoules	290
Calories	70
Protein	3g
Fats – Total Includes:	0.20

–Saturated fat –Polyunsaturated fat –Mono-unsaturated	0.03 0.14 0.03
Saturated : unsaturated fat ratio	0.2
Carbohydrates – Total *Available* Includes: –Natural sugars –Natural starches –Added sugars –Added starches *Unavailable* Includes: –Dietary fibre	14.6g 13.4g 0.5g 12.9 0 0 1.24g 1.24g
Sodium	2mg
Potassium	69mg
Glycemic load	8
Diabetes exchange	1
Ingredients: Wild rice	

Source: AusFoods, 2019

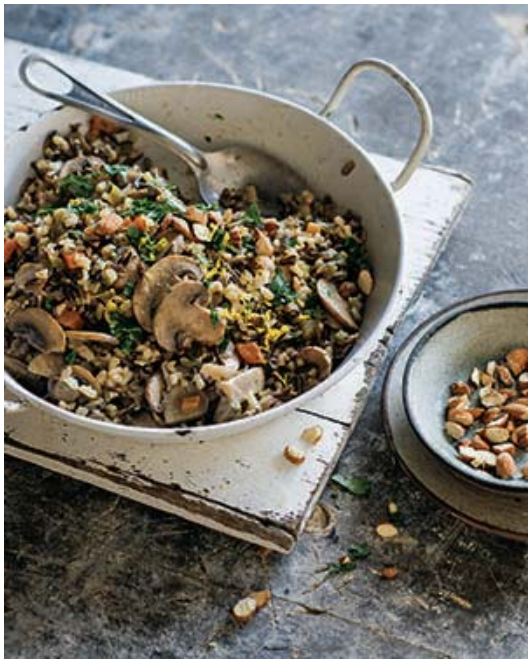
Read More:

- Red Lake Nation Foods Wild Rice
- Native Harvest Wild Rice
- Whole Grains Council

THE GOOD CARBS KITCHEN

WILD AND BROWN RICE PILAF WITH MUSHROOMS AND ALMONDS

0:20 Prep • 1:15 Cook • 8 Servings • Nourishing • Main meal • Gluten-free• Vegetarian



INGREDIENTS
2 tablespoons olive oil
1 tablespoon butter
1 small onion, very finely chopped
1 small carrot, scraped, finely chopped
1 small stick of celery, finely chopped
2 garlic cloves, crushed
3 cups (270g) sliced mushrooms
Salt flakes and freshly ground pepper
1 cup (200g) brown rice
1 cup (190g) wild rice
4 cups (1 litre) vegetable stock
2 teaspoon lemon zest from the zest of 1 lemon
1 tablespoon lemon juice
2 tablespoons freshly chopped parsley
½ cup (80g) coarsely chopped raw almonds

METHOD
Put the oil and butter in a large sturdy pot with a close-fitting lid. Add the onion, carrot, celery and garlic and gently cook for 5 minutes or until the vegetables soften. Add the mushrooms, increase the heat to medium and cook and stir 5 minutes.

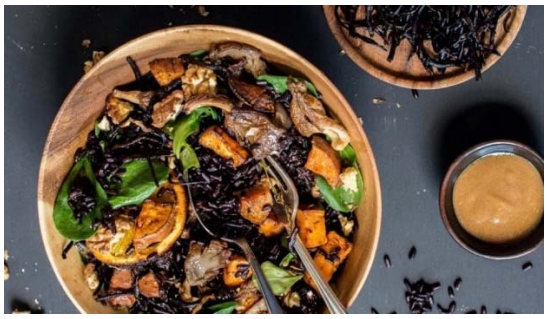
Rinse the wild and brown rice, drain well and add to the pot. Stir until the grains are well coated with vegetable and oil mixture. Pour in the stock, bring to a boil and then reduce the heat to as low as you can. Put the lid on the pot (if it is not tightly fitting, cover the pot with foil and then ram the lid on) and cook for 50 minutes. It is important that you do not lift the lid during this time.

Remove the pot from the heat and lift the lid. Taste the rice – it should be al dente. If not, replace the lid and cook for another 10 minutes. The rice should not appear wet and must have a slight crunch. Add salt and pepper to taste with the lemon zest and juice. Replace the lid, remove from the heat and let the rice rest for 10 minutes. Add the parsley and almonds and fluff with a fork.

NUTRITION
Per serve 1505kJ/ 360 calories; 6g protein; 27g fat (includes 3.5g saturated fat; saturated : unsaturated fat ratio 0.15); 21g available carbs (includes 5.5g sugars and 15.5g starches); 5.5g fibre; 255mg sodium; 505mg potassium; sodium : potassium ratio 0.5.

RECIPE
The Good Carbs Cookbook, Murdoch Books.

AUTUMNAL WILD RICE SALAD WITH HIJIKI
0:20 Prep • 1: 15 Cook • 6 Servings • Nourishing • Main meal • Gluten-free• Vegan



INGREDIENTS
2 cups (300g) wild rice
15g (½oz) dried hijiki or arame
2 medium-sized orange-fleshed sweet potatoes, washed, and cubed
1 large red onion, thinly sliced
½ orange, peeled and thinly sliced
1 teaspoon smoked paprika (pimenton)
4 sprigs fresh thyme
Coarse sea salt and freshly ground black pepper, to taste
Olive oil for roasting and sautéing
200g (7oz) oyster mushrooms, wiped clean and torn in small strips
½ cup dried cranberries
150g (5oz) baby spinach
1 cup walnuts, coarsely chopped
Handful of fresh Italian parsley, finely chopped

Miso Dressing
¼ cup white miso paste
2 tablespoons extra virgin olive oil
2 tablespoons orange juice
1 tablespoon + 1 teaspoon soy sauce or tamari
1 tablespoon sesame oil
2 teaspoons mirin

METHOD
Cook the wild rice according to directions on the package (allow at least 45 minutes), drain, place the lid on the pan, and let stand for 10 minutes. Meanwhile, soak the hijiki (or arame) for 30 minutes in lukewarm water. Once it has rehydrated, drain and dab it dry.

Preheat the oven to 200°C (400°F). Line a baking sheet with parchment paper.

Combine the sweet potatoes, onion, orange slices, smoked paprika, and thyme and season with salt and pepper. Toss with a generous splash of olive oil. Arrange the mixture on the baking sheet and bake for 25–30 minutes, until golden brown and crispy. Flip everything halfway through to allow even browning on both sides. After 20 minutes, use a spatula toss in the cranberries. Return the pan to the oven for the remaining 5–10 minutes, until the potatoes are golden brown and crispy. Remove from the oven and cool.

Heat a splash of olive oil in a skillet. Sauté the oyster mushrooms until golden brown and crispy. Season with salt and pepper.

To make the dressing, whisk all the ingredients into a nice smooth sauce. Combine the dressing with the hijiki.

Toast the walnuts in a skillet (small frypan) until golden brown. Divide the spinach over four plates and add a scoop of wild rice to each. Serve with the roasted vegetables. Top the salad with the hijiki and miso dressing. Garnish with the walnuts and fresh parsley.

NUTRITION
Per serve (based on 6 servings) 2170kJ/ 520 calories; 19g protein; 30g fat (includes 3g saturated fat; saturated : unsaturated fat ratio 0.18); 38g available carbs (includes 24g sugars and 14g starches); 13g fibre; 943mg sodium; 1042mg potassium; sodium : potassium ratio 0.9.

RECIPE
Ocean Greens, The Experiment Publishing.