values of vegetables and staples in past and present diets in Taiwan

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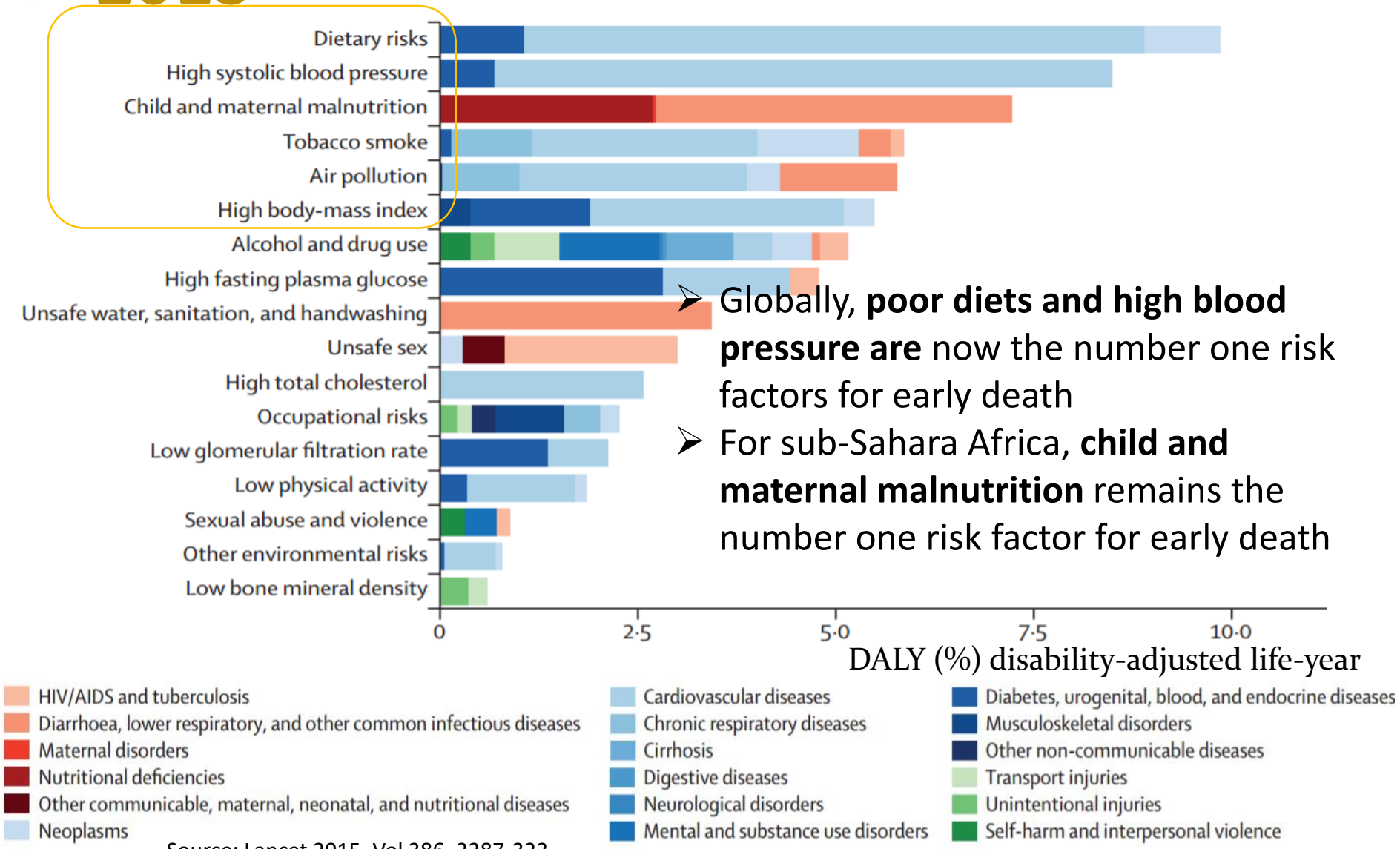
Global DALY attributed to risk factors, 2013



- Globally, **poor diets and high blood pressure are** now the number one risk factors for early death
- For sub-Sahara Africa, **child and maternal malnutrition** remains the number one risk factor for early death

Source: Lancet 2015, Vol 386, 2287-323

Classification of phytochemicals

Classification of phytochemicals and their main effects

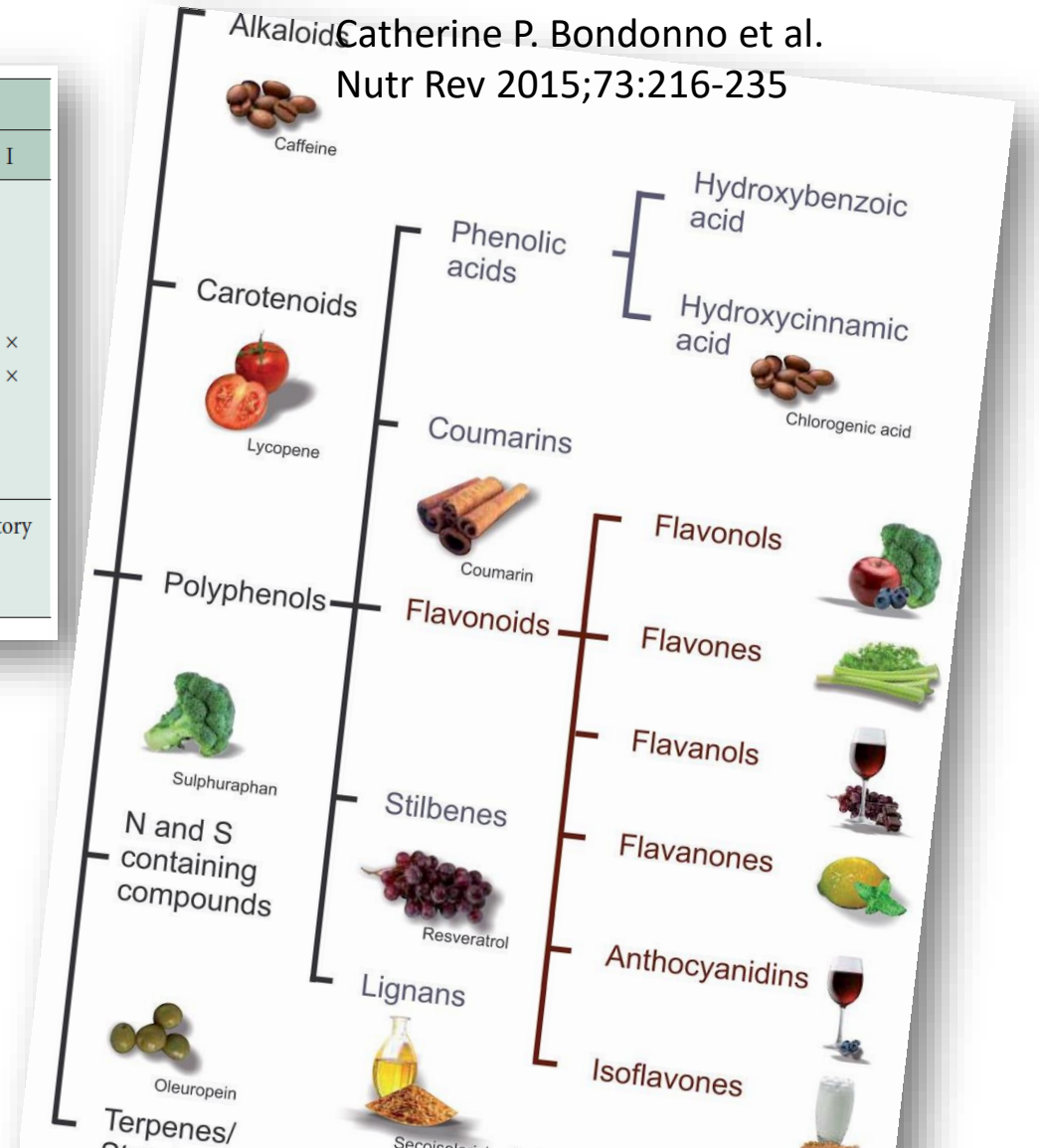
Phytochemical	Evidence for the following effects								
	A	B	C	D	E	F	G	H	I
Carotenoids	×		×		×			×	
Phytosterols	×							×	
Saponins	×	×			×			×	
Glucosinolates	×	×						×	
Polyphenols	×	×	×	×	×	×	×		×
Protease inhibitor	×		×						×
Monoterpenes	×	×						×	
Phytoestrogens	×		×		×				
Sulfides	×	×	×	×	×	×	×	×	

A = anticarcinogenic; B = antimicrobial; C = antioxidative; D = antithrombotic; E = immunomodulatory properties; F = anti-inflammatory; G = influence on blood pressure; H = cholesterol-lowering effect; I = modulate blood glucose levels.

Forsch Komplementmed 2016;23:69-74
DOI: 10.1159/000444063

NUTRITION REVIEWS®

Catherine P. Bondonno et al.
Nutr Rev 2015;73:216-235



Health benefits from consuming diverse plant foods are evident but would not occur if they are NOT in our diets

- Plant foods provide essential nutrients and bioactive phytochemicals beneficial to human health
- Vegetables are the most diverse in species, shapes, flavors, colors and contain the most diverse and abundant phytochemicals
- Modern food system emphasizes mass produced and cost-effective production and distribution
- Vegetable production is labor intensive and some are perishable that do not fit to modern food systems
- Vegetables traditionally in our diets have narrowed down to fewer species (mostly tomato, onion, cabbage, carrot and cucumber) which have longer shelf life and better postharvest properties.

The study compared species and nutritional values of staples and vegetables used in the past and at present in Taiwan

Methods:

- **Plant foods in past diets:**
  - Summarized based on reviews of ethnobotanical studies
- **Plant foods in present diet:**
  - National consumption survey in Taiwan (years 2005-2009).
- **Nutrient content data:**
  - WorldVeg nutrient data (nutrition.worldveg.org) and other food composition databases.
- **Reported functional properties reviewed for vegetables:**
  - Properties: anticarcinogenic, antimicrobial, antioxidative, anti-diabetic and anti-inflammatory activities

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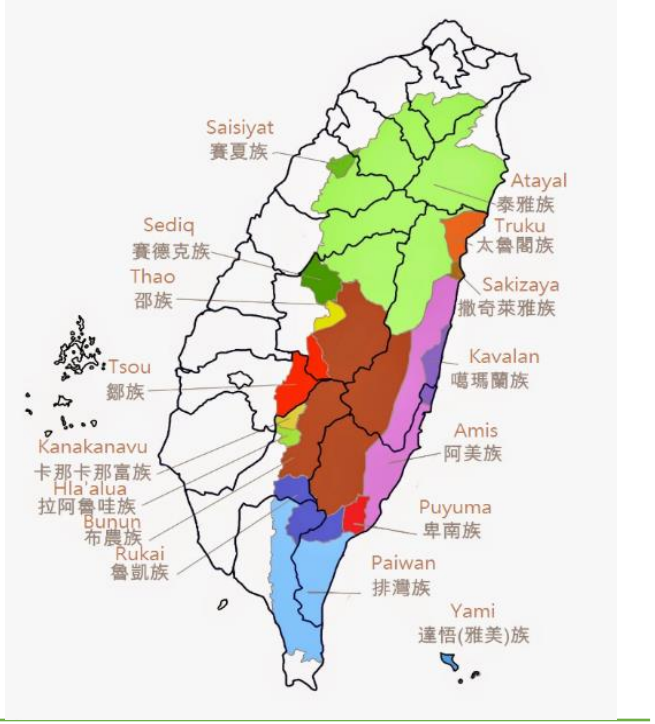
Number of edible plants by utilization and indigenous people groups of Taiwan



Groups	Plant foods	Staples	Vegetables	Fruits	Processed	Preference	Spice
Amis	121	15	75	24	3	8	5
Truku	105	17	44	38	1	13	7
Bunun (Takivatan)	120	9	60	27	9	17	13
Puyuma	83	7	43	23	3	10	8
Paiwan	64	3	28	26	5	8	5
Tsou	109	11	39	43	8	14	9
Bunun (Takibakha)	93	8	31	46	4	4	8
Sediq	36	4	15	14	2	4	3
Atayal	72	6	33	19	2	19	4

Number of species included in PROTA, PROSEA and Taiwan Indigenous Vegetables

PROTA and PROSEA: Plant Resource of Tropical Africa and Southeast Asia

Total numbers in the list

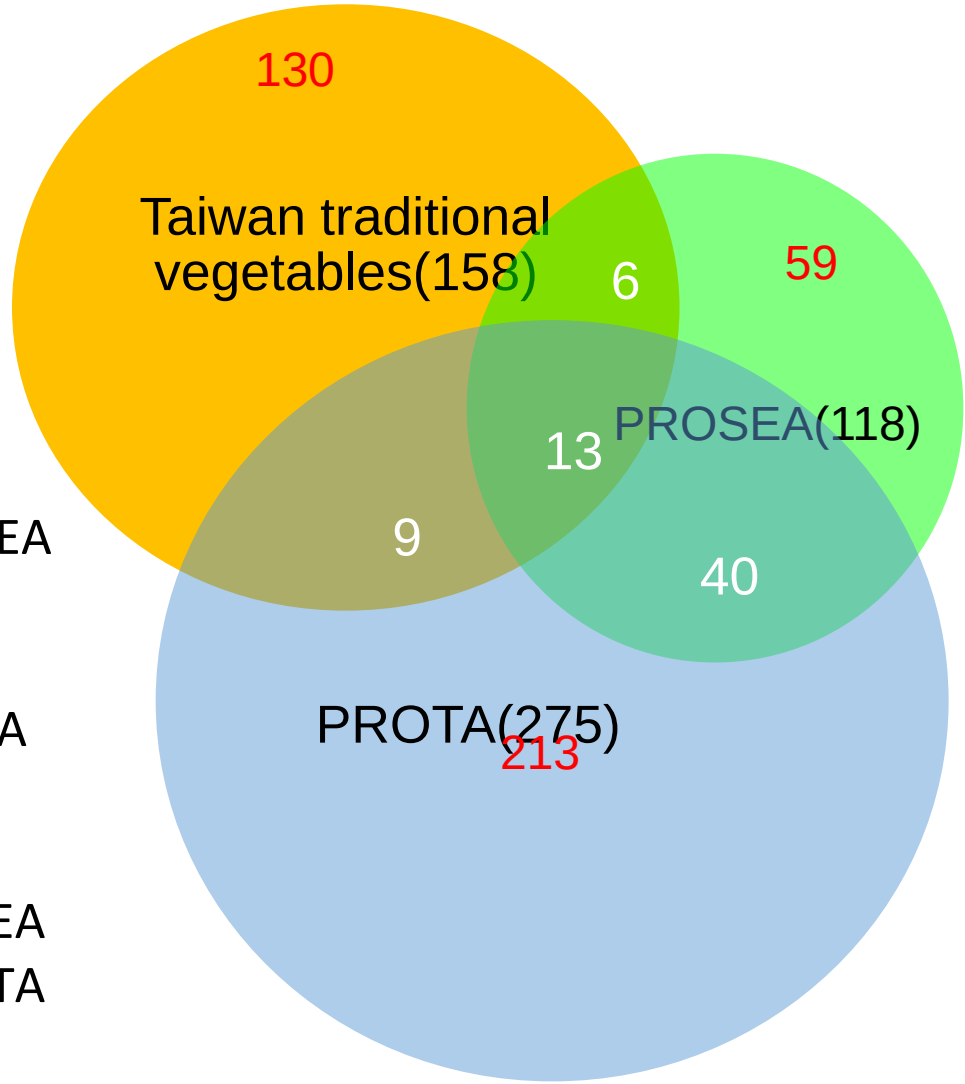
- PROSEA: 118 species
- PROTA: 275 species
- Taiwan: 158 species

Overlap between

- **Taiwan & PROSEA**
  12% of Taiwan IV included in PROSEA

- **Taiwan & PROTA**
  14% of Taiwan IV included in PROTA

- **PROTA & PROSEA**
  19% of PROTA IV included in PROSEA
  45% of PROSEA IV included in PROTA



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Three vegetable groups

- **African and Asian traditional** vegetables (200 species, n=320)
- **Taiwan (Ami) traditional** vegetables (54 species, n=59)
- Taiwan **commonly consumed** vegetables (30 species, n=35)

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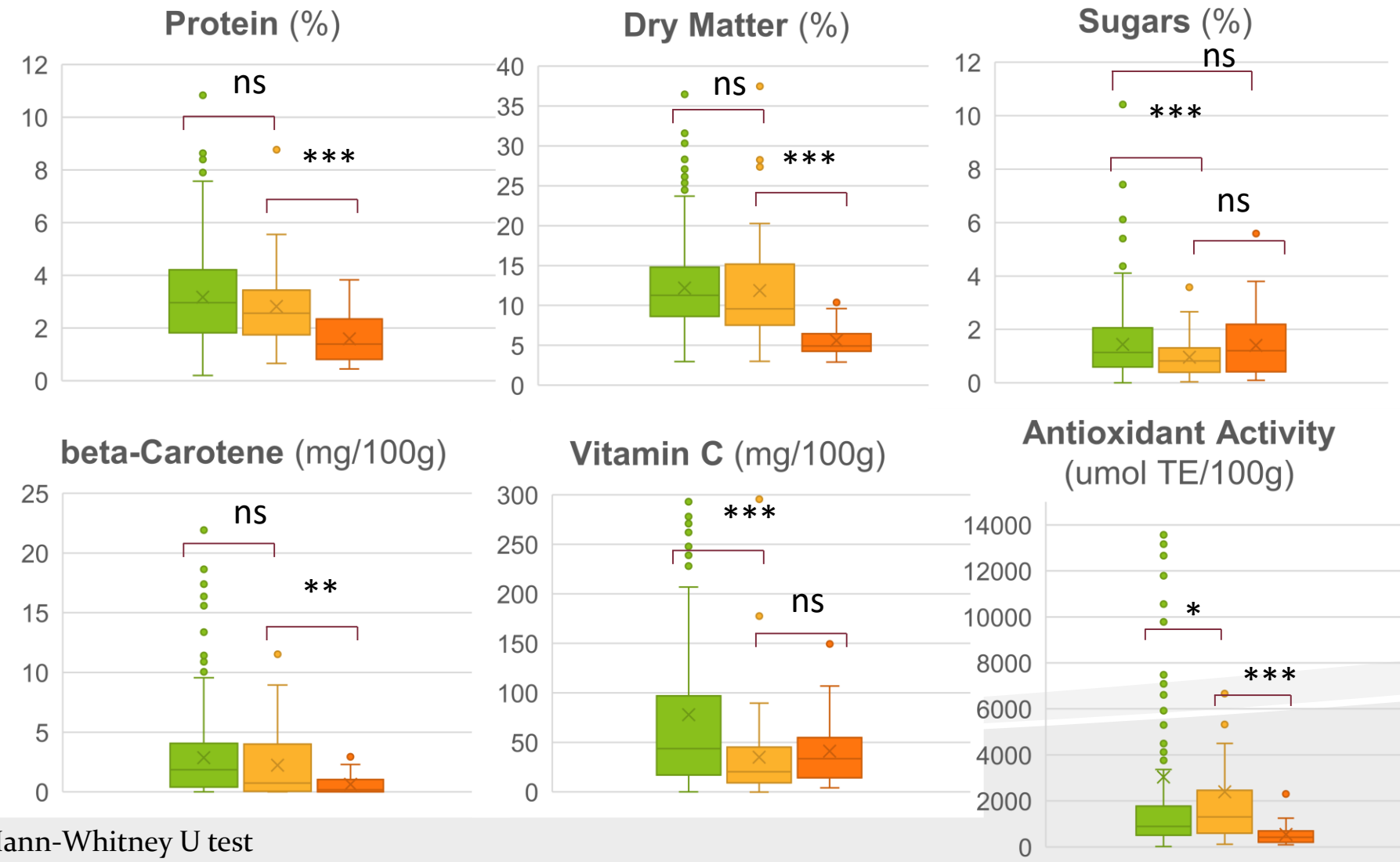
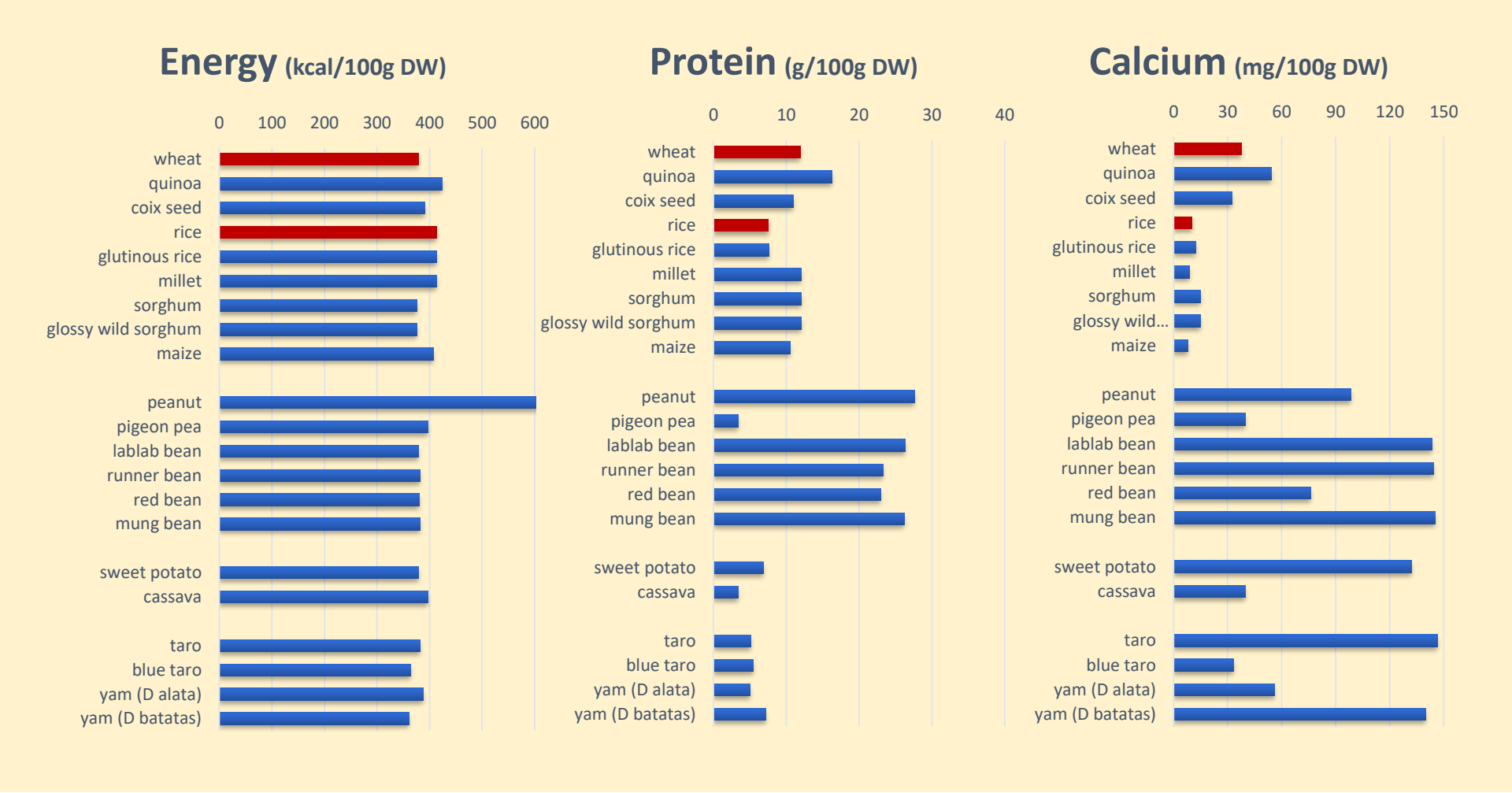
Comparison of nutrient values among three vegetable groups

African and Asian traditional vegetables
Taiwan-Ami traditional vegetables
Commonly consumed vegetables in Taiwan



Mann-Whitney U test

Nutrient contents of staples



Results:

- Around 380 edible plants from 800 ethnobotanic plant species reported in Taiwan
- Primary plant foods:
  - Rice (42%) and wheat (34%) dominate at present
  - Higher diversity (> 30 species) in the past and more nutritious
- Traditional vegetables
  - About 150 species in the past
  - 12-14% overlap with PROTA and PROSEA
  - More nutrients and lower sugars
  - Half of them used as both food and herbal remedies

Conclusions:

- Over time, a relatively small number of cultivated crop species and varieties have dominated production, market and dietary patterns among Taiwanese.
- The study lays out the plant foods native to the island and their potential to enrich our current food systems for healthier diets and reclaim part of its cultural heritage.