International Cactus Pear Workshop 2015
University of the Free State - Bloemfontein – South Africa

Medicinal Uses of Cactus Products

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The use of natural substances for disease prevention and treatment is a continuously increasing global trend.

- More than 80 % of the world population uses medicinal plants for their health care.
- Pharmaceutical industries are constantly looking for active molecules. The phytoterapic market is millonaire and still growing.

Popular Uses of Cactus as Medicines

Cactus plants have been traditionally used in folk medicine in several countries since a long time.

Fruits, cladodes, seeds and flowers have been used **to cure o prevent diseases**.

FRUITS

CLADODES

SEEDS

FLOWERS

Traditional uses of cactus in folk medicine

- The use of the pads as compresses has been recommended for centuries to accelerate wound healing.

- Cladodes have also been used in folk medicine to treat gastric ulcers and indigestion.

Other actions ascribed to cactus cladodes

- Emollient and Moisturizing effects
- Cicatrizant properties
- Hypoglycemic action
- Gastritis relief

Uses in Popular Medicine

Fruits and Juices

- Diuretic Effect
- Hypoglycemic Action
- Anti-allergic Activity
- Analgesic and Anti-inflammatory action
- Indigestion Treatment
- Hangover symptoms relief

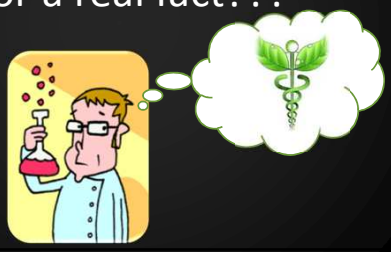
Dried Flowers

- Diuretic and depurative effects
- Removal of kidney stones

Uses of cactus flower petals to treat urological problems is well-known. Renal colic treatment has already been mentioned by Pitrè in 1896 in a *Sicilian Popular Medicine* report.

The properties of the dried flower infusions to prevent prostate cancer are also known .

Is this ancient knowledge just a myth or a real fact???



Scientific assessments of the medicinal properties

- ✓ Bioactive Constituents
- ✓ *In vitro* activity assays
- ✓ *In vivo* activity assays in animal models and humans

Cladodes

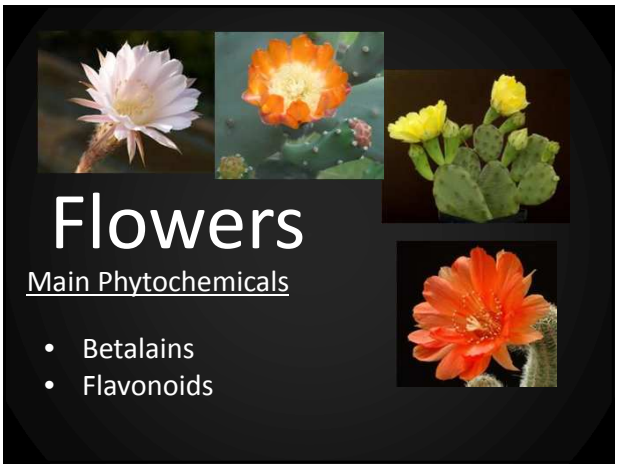
Main Phytochemicals

- Mucilage
- Chlorophylls
- Flavonoids
- Minerals
- Dietary Fiber

Fruits

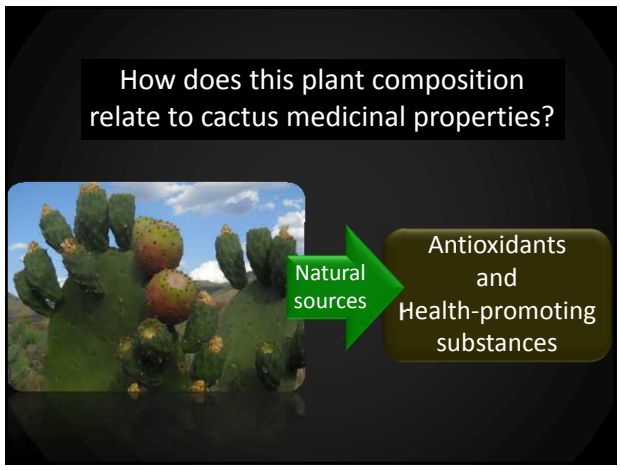
Main Phytochemicals

- Vitamin C
- Phenolic compounds
- Carbohydrates
- Fibers
- Betalains

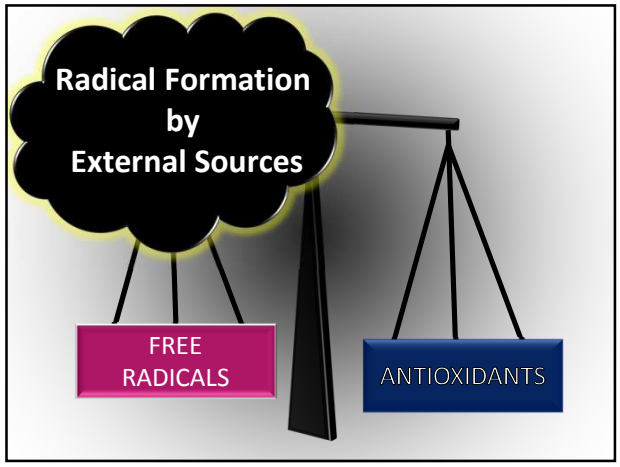


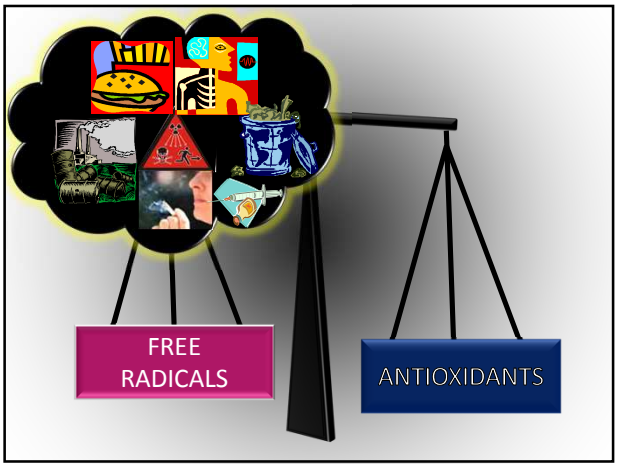
PHYTOCHEMICALS IN SEED OIL

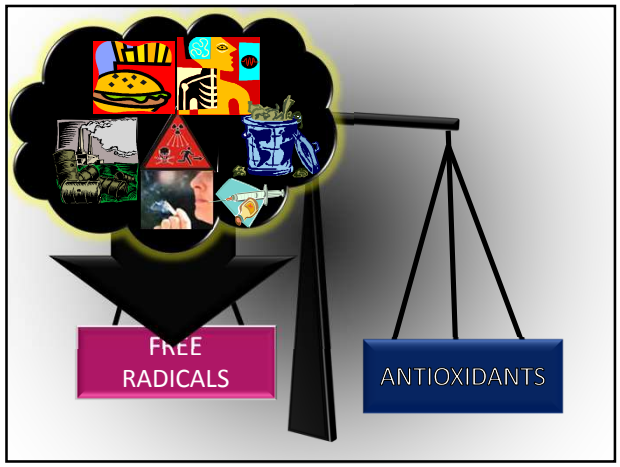
- The seeds correspond to **10-15%** of the fruit weight
- From seeds, the oil content is low (**7-10 %**).
- The oil is rich in unsaturated fatty acids
  (**70%** PUFA, linoleic acid **60%**)
- Oil has also other constituents such as **phytosterols**, **tocopherols** and **polyphenols**.
- The endosperm of the seed is composed of **arabinan-rich polysaccharides.**
- Global market price is very high (~US$ 400-800/L)
  (Grapeseed oil and Sweet almond oil US$100/L)

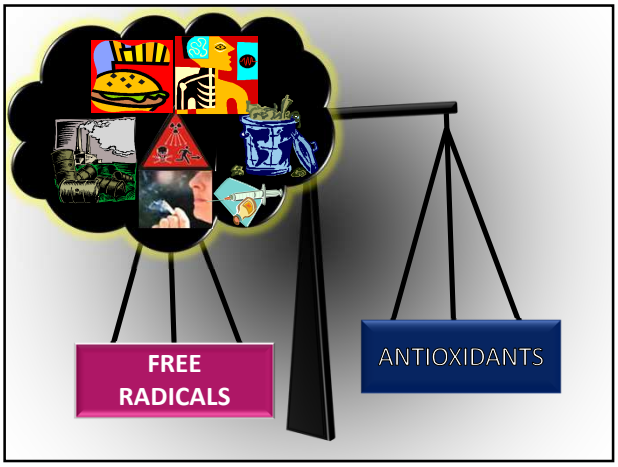


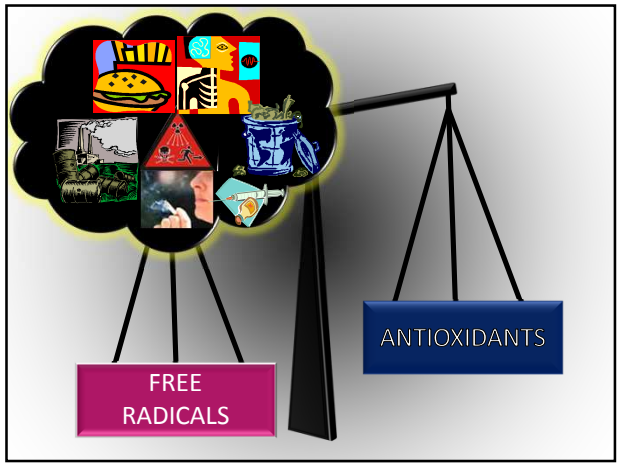
There is usually a **balance** in the body between the formation of free radicals generated by normal metabolism and a proper system of antioxidant protection.

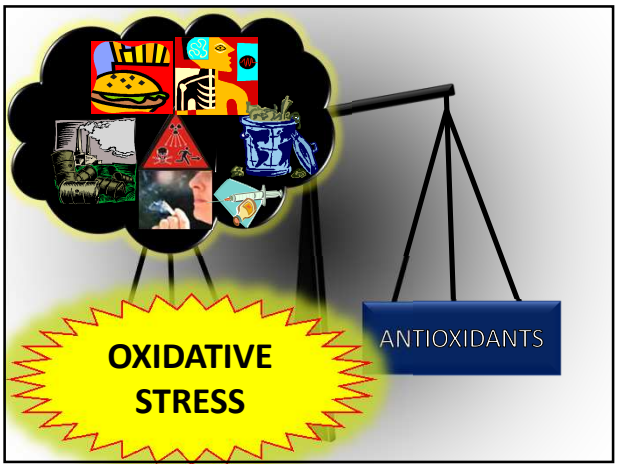


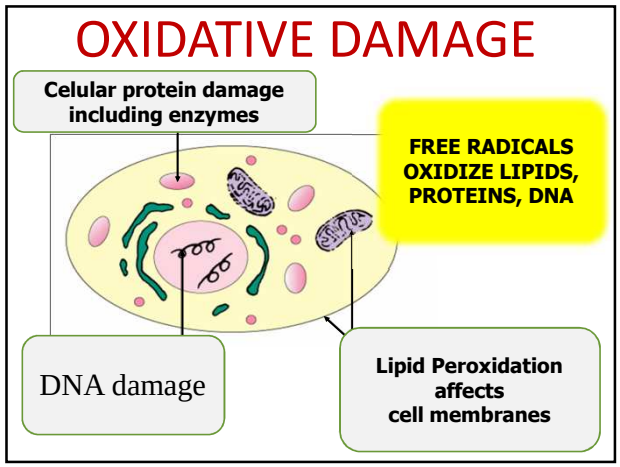






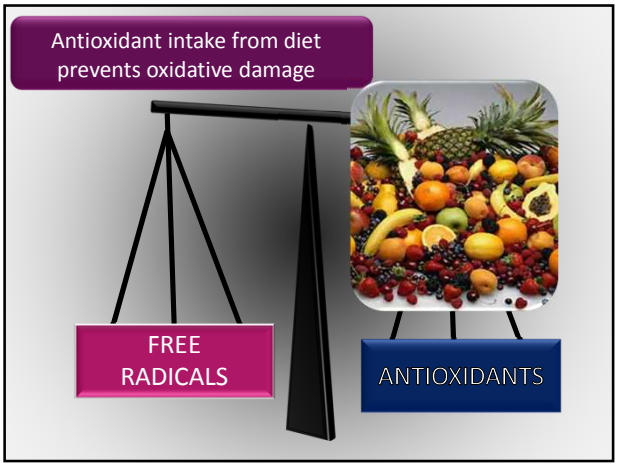


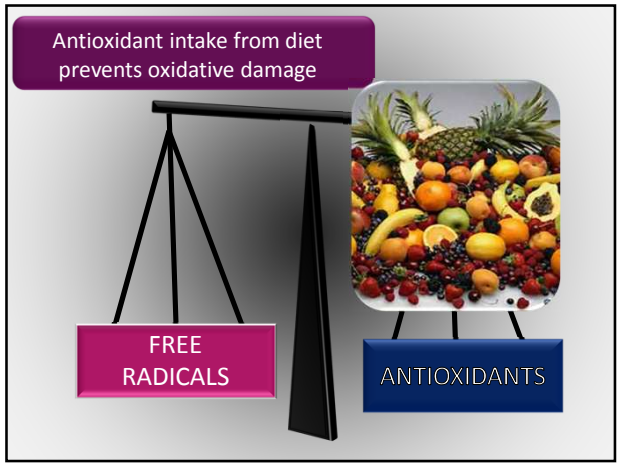




Free Radicals have been related to serious diseases

- Cancer
- Heart Conditions
- Cataracts
- Atherosclerosis
- Alzheimer´s and Parkinson´s Diseases





Antioxidant intake from diet prevents oxidative damage

BIOACTIVE SUBSTANCES OCCURING IN CACTUS PLANT HAVE BEEN RECOGNIZED AS

ANTIOXIDANTS

- ✓ **BETALAINS**
- ✓ **CAROTENOIDS**
- ✓ **VITAMIN C**
- ✓ **POLYPHENOLS**

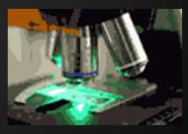
In vitro antioxidant assays

The extracts of different cactus species have been assayed by numerous research groups during last decades.

The antioxidant activity of cactus extracts and pure constituents has been confirmed.

CLADODES **FRUITS** **SEEDS** **ROOTS**

The most remarkable scientific evidence found up to now concerning the medicinal properties of cactus products



Medicinal properties	Studied species and active part of the cactus plant	Studied System-Reference
Antiviral action	*O. streptacantha* cladode extract	Intracellular virus replication inhibition and extracellular virus inactivation (Ahmad et al., 1996)

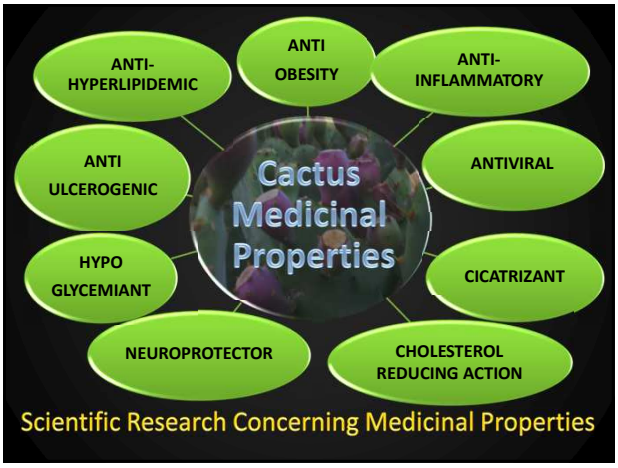
Medicinal properties	Studied species and active part of the cactus plant	Studied System-Reference
Antiobesity factor	*Opuntia* sp. cladode	Humans (Frati Munari et al., 2004)
Hypoglycemic and antidiabetic effects	*Opuntia megacantha*	Diabetic rats (Bwititi et al., 2000)
	Opuntia lindheimeri	Diabetic pigs (Laurenz et al., 2003)
	Opuntia ficus-indica, O. lindheimeri, and O. robusta	Diabetic rats (Enigbocan et al., 1996)
	O. streptacantha	Humans (Meckes-Lozyoa, 1986)
	O. monacantha cladode extract	Diabetic rats (Yang et al., 2008)
	Opuntia ficus-indica seeds	Rats (Ennouri et al., 2006a)
	Opuntia ficus- indica seed oil	Rats (Ennouri et al., 2006b)
	Opuntia streptacantha	Humans (Frati Munari et al., 1991 and 1992)
	Opuntia filiginosa fruit extract	Rats (Trejo-González et al., 1996)

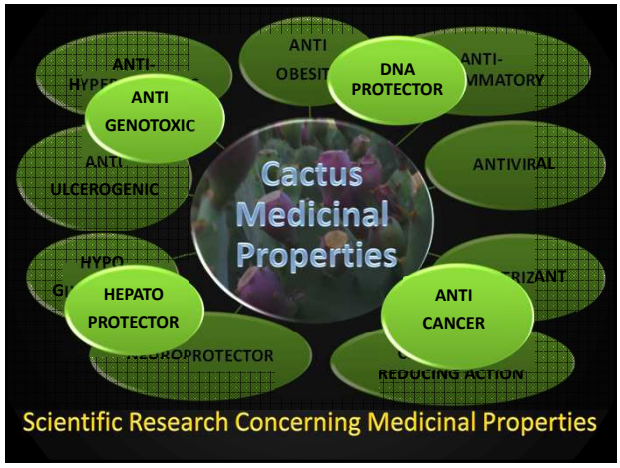
Medicinal properties	Studied species and active part of the cactus plant	Studied System-Reference
Neuroprotection against cerebral ischemia	*Opuntia ficus-indica* extracts	In vitro studies in cultured mouse cortical cells e in vivo studies in gerbils (Kim et al., 2006)
Antiulcerogenic effects and antigastritis	*Opuntia ficus-indica* cladodes	Rats (Galati et al., 2001)
	Opuntia ficus-indica fruit juice	Rats (Galati et al., 2003)
	Opuntia ficus-indica cladodes	Rats (Galati et al., 2002)
	Opuntia ficus-indica var. Saboten stems	Rats (Lee et al., 2002a)
	Opuntia ficus-indica var. Saboten fruit	Rats (Lee et al., 2001)

Medicinal properties	Studied species and active part of the cactus plant	Studied System-Reference
Protection upon nickel-induced toxicity	*Opuntia ficus-indica* cladode extract	Rats (Hfaiedh et al., 2008)
Protection against oxidative damage induced by zearalenone	*Opuntia ficus-indica* cladode	Mices (Zourghi et al., 2008)

Medicinal properties	Studied species and active part of the cactus plant	Studied System-Reference
Cancer preventive properties	*O. ficus-indica* fruits aqueous extracts	Ovarian and cervical epithelial cells, as well as ovarian, cervical, and bladder cancer cells (Zou et al., 2005), ovarian cancer cells,(Feugang et al., 2010); leukemia cell lines (Sreekanth et al., 2007)
	O. humifusa fruit extracts	Breast cancer and glioblastoma human cell lines (Yoon et al.,2009; Hahm et al., 2010), (Harlev et al., 2013)
	P. grandifolia	Cytotoxicity against cancer cells (Sri Nuresti et al., 2009; Liew et al. 2012)
	Opuntia spp. Fruit juice	Prostate, colon, mammary and hepatic cancer cells (Chavez Santo-Scoy et al., 2009)
	Hylocereus spp. extracts	In vitro antiproliferative action (Kim et al., 2011; Wu et al.; Jayakumar et al., 2011)

Medicinal properties	Studied species and active part of the cactus plant	Studied System-Reference
Anti Cancer properties	Aqueous extracts of cactus pear	Suppressed tumor growth in femal mice xenografted with SKOV3 cells (Zou et al., 2005)
	O. humifusa cactus frit powder	Decreased number of papilomas and epidermal hyperplasia in mice (Lee et al., 2012).
	Polysaccharides from cactus pear	Inhibited growth of tumors in mice (Liang. Et al., 2012)





Cladodes

- Antiulcerogenic effects and antigastritis action Anti-inflammatory action
- Antiobesity factor, hypoglycemic action, and antidiabetic effects
- Anti-hyperlipidemic effect and cholesterol reducing action

Fruits

- Hepatoprotection
- Antiulcerogenic effects and antigastritis
- Hypoglycemic and antidiabetic effects
- Anti-inflammatory effects
- Cancer preventive properties
- Antiproliferative effects
- Anti-hyperlipidemic effect and cholesterol reducing action
- Platelet function improvement
- Alcohol hangover symptoms alleviation

Flowers

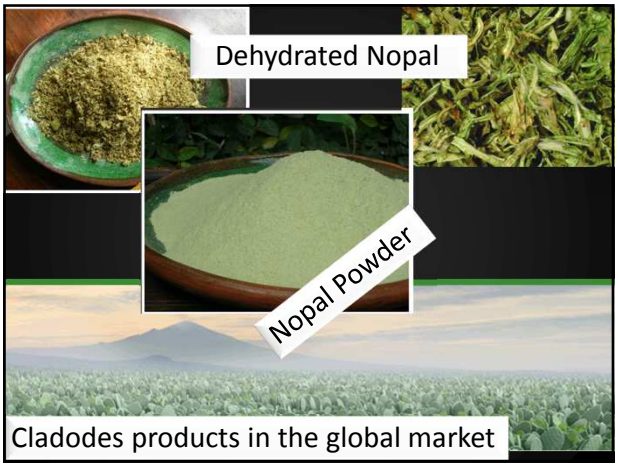
- Beneficial effects in benign prostatic hyperplasia
- Diuretic effect
- Anti-inflammatory effects

Seeds and Seed oil

- HDL-cholesterol increase, body weight decrease, LDL and serum glucose level reducing action
- Hypoglycemic and antidiabetic effects
- Atherogenic index decreasing effect and seric cholesterol reducing action.
- Hypolipidemic effect of seeds

HIGH-VALUE-ADDED CACTUS PRODUCTS

- NUTRACEUTICS
- DIETARY SUPLEMENTS
- FUNCTIONAL FOODS
- COSMETICS



Cladodes products in the global market


Poudre Nopale
Nopal powder
It can be used as food aditive to take benefits from its functional properties
Prepared by sun dehydration from mature nopal pads.
US $ 5-10/Kg


Nopal pills and capsules
NOPAL CACTUS
Nopal Aloe Vera
Sello Verde
NOPAL
SWANSON
Prickly Pear Cactus
Opuntia
NutraFit
Nopalea
NeOpuntia


Nopal Juice
NOPAL
BEBIDA DE SÁBILA Y NOPAL
JUGO


FUNCTIONAL FOODS
Nopaltilla
Tortillas de Nopal
www.nopaltilla.com
Nopal
Nopaltilla(TM) The Healthy Green Cactus Tortilla
To a Healthier More Nutritious Lower Calorie Meal
Tortilla
made Of
Prickly Pear Cactus
LINAZA NOPAL


Señor Cactus
Señor Cactus
200g
CHARRAS
Cactus Flaxseed Nopal Linaza


FUNCIONAL FOODS
Healthy drinks and Juices
CAHILL
PRICKLY PEAR
nopalea
Cahill Prickly Pear Thirst Quencher
Rich in Vitamin C, Flavonoids & Antioxidants
100% Natural
• Protect against premature aging
• Reduce inflammation
• Promote optimal cellular health
• Detoxify the body
Sonoran Bloom - The Power of Nopal Cactus


CACTUS FRUIT FUNCTIONAL PRODUCTS
Solar Dried Fruits
JAM & JELLYS
Hangover Terminator
Syrup
Prickly Pear Fruit Spread


DRIED FLOWERS FOR MEDICINAL TEAS OR INFUSIONS
Fleur d'Opuntia


Maceration of dried flowers in argan oil


COSMETIC PRODUCTS
Seed Oil
Cactus seed oil 100 % organic from morocco
anti-wrinkle cactus seeds oil


550 € / L
10 mL x 29 €
Seed Oil
350 € / L


Soaps and Shampoos

- Cacti are excellent candidates for incorporation in the diet as **healthy food**.
- The different parts of the cactus plant can be exploited for the production of **nutraceutics and cosmetics** for the food, pharmaceutical and cosmetic industries.

New perspectives

- Advances in analytical approach and the development of innovative technologies open new possibilities for discovering **new medicinal properties** and also for developing **new industrial cactus products**.

Cactus crop offers to arid or semiarid regions much more than just food and fodder.

It offers the possibility of the local development of industries engaged in the manufacture of high added value products which are demanded in the global market.

- Thank you for your kind attention!