



## Chilies more than just pungent!

Chilies (*Capsicum spp.*) are an economically very important commodity with an extraordinary high number of native varieties in Peru and Bolivia. These fruits were used since 6000 years as spice, vegetable and medicine. Besides their characteristic pungency, aroma and flavor, chilies comprise a huge number of different valuable and health promoting compounds. Of major importance are the capsaicinoids, which are responsible for the hot taste of chilies. In addition, the fruits contain high concentrations of the vitamins C and E as well as carotenoids and flavonoids. The health promoting attributes are based on the antioxidative (radical scavenging), anti-inflammatory and anticancer properties of these compounds. Concentration and pattern of these phytonutrients are primarily influenced by the genome and different environmental and processing factors [1,2].

One main aspect of the presented research project is to achieve specific compositional data for the wide number of not yet characterized native chilies from Bolivia with the aim to discover varieties with outstanding attributes. Together with value chain activities and appropriate market strategies, these elite materials shall allow improving the income of small scale Bolivian farmers.



## Analytical parameters and results

	<b>Capsaicinoids</b> (mg/100g)	<b>Extractable color</b> (ASTA-20.1 value)	<b>Fat</b> (g/100g)	<b>Polyphenols</b> (g/100g)	<b>TEAC</b> (mmol/100g)	<b>Flavonoids</b> (mg/100g)	<b>Vitamin C</b> (mg/100g)
<b>Method</b>	HPLC-FLD	Photometrically after extraction with acetone	Micro-method according to Schulte [3]	Photometrically according to Folin-Ciocalteu	Photometrically, reaction with a stable radical cation	Quercetin, luteolin, kaempferol and apigenin after hydrolysis by HPLC-DAD	Determination of dehydro- and ascorbic acid by HILIC-DAD
<b>Relevance</b>	Pungency, antioxidative, antiinflammatory and anticancer	Indicator for carotenoids (Provitamin A)	Production of seed oil, indicator for vitamin E	Molecular parameter for different antioxidants	Parameter for radical scavengers	Antioxidative, antiinflammatory and anticancer	High levels in chili and paprika; vitamin and antioxidant
<b>Mean</b>	<b>138</b>	<b>44</b>	<b>14,7</b>	<b>1,5</b>	<b>4,1</b>	<b>8,3</b>	<b>17</b>
<b>Median</b>	<b>93</b>	<b>38</b>	<b>14,1</b>	<b>1,5</b>	<b>4,1</b>	<b>7,9</b>	<b>5</b>
<b>Range</b>	<b>0-1028</b>	<b>3-127</b>	<b>6,7-32,8</b>	<b>0,9-2,2</b>	<b>2,9-7,0</b>	<b>0,4-46,8</b>	<b>5-437</b>

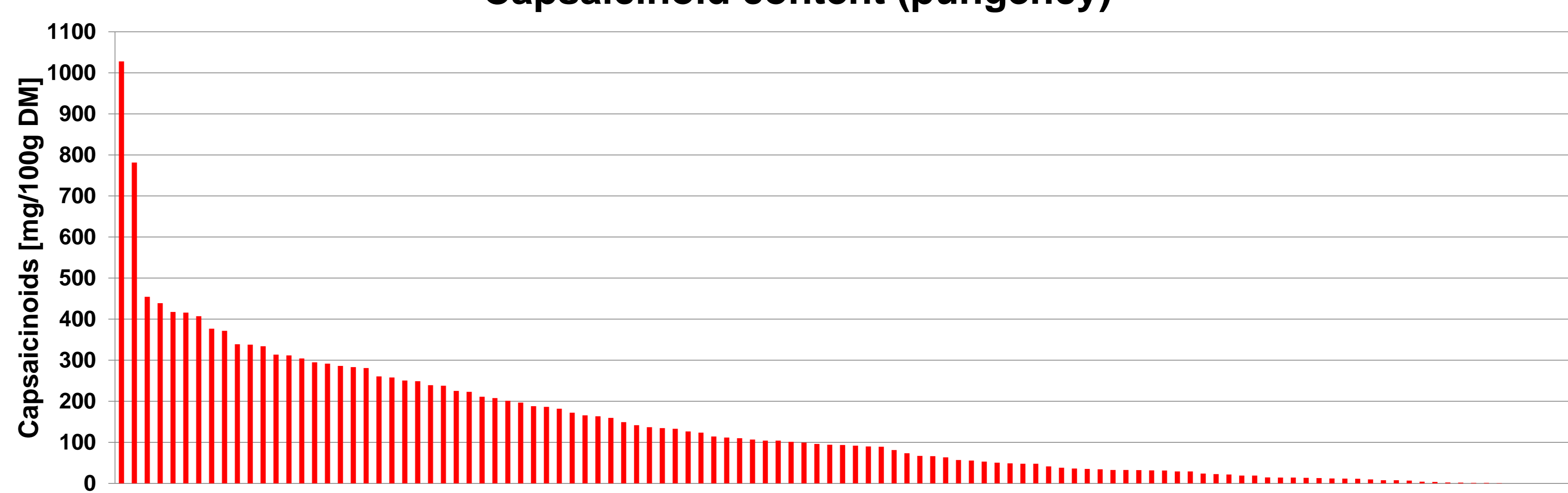
## Discussion of results

The analytical results of 114 different native, dried and milled Bolivian chili varieties provides a broad picture of the biological diversity of this genus. The sample pool includes the domesticated species *Capsicum annuum*, *C. chinense*, *C. frutescens*, *C. baccatum*, *C. pubescens*, as well as several wild species, which were taxonomically classified as *C. chacoense*, and *C. eximium*.

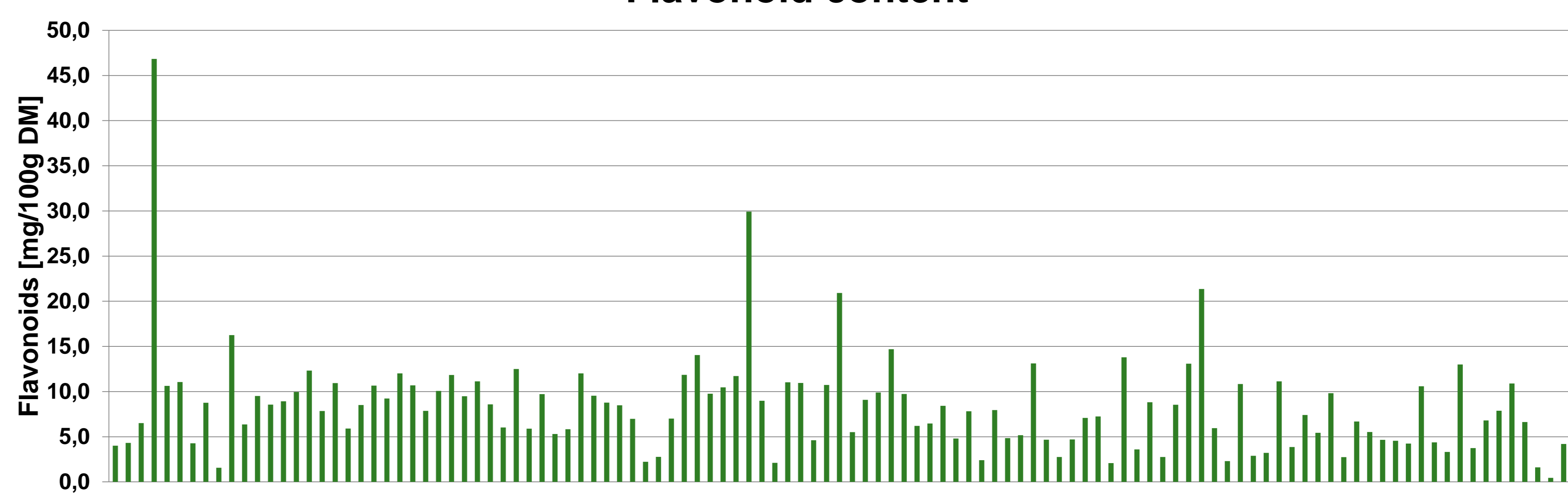
The table and diagrams show the wide variability of the individual parameters of the investigated chilies and illustrate the great potential of underutilized crop diversity. We identified varieties having exceptionally high levels of bioactive compounds. In addition to varieties with high polyphenol and flavonoid contents, two species with high vitamin C levels (216 and 437 mg/100g) were also found. Taking into account that during the drying process most of the vitamin C is degraded, these are unique varieties. Even the discovery of a chili variety with a fat content of 32.8 g/100g is remarkable and suitable for commercial extraction of chili seed oil.

From the collected data, a total of 40 varieties with outstanding attributes were identified (promising material).

## Capsaicinoid content (pungency)



## Flavonoid content



114 analyzed chili varieties sorted by ascending capsaicinoid and related flavonoid content

## Future

The intention is to replant those 40 varieties being identified as promising material and to analyze the contents of bioactive and valuable compounds for getting a year-to-year comparison (2011 and 2012). The planting in different locations and climatic zones in Bolivia shall show how these parameters will affect the biochemical composition.

## Literature

1. Perry L et al. (2007), Starch Fossils and the Domestication and Dispersal of Chili Peppers (*Capsicum spp. L.*) in the Americas, *Science* 315:986-988
2. Wahyuni Y et al. (2011), Metabolite biodiversity in pepper (*Capsicum*) fruits of thirty-two diverse accessions: Variation in health-related compounds and implications for breeding, *Phytochemistry* 72:1358-1370
3. Schulte E (2001), Mikromethode zur schnellen gravimetrischen Bestimmung des Fettgehaltes von Lebensmitteln nach Säureaufschluss, *Deutsche Lebensmittel Rundschau*, 97:85-89

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