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PROMOTIONAL FEATURES

Maca has been used for centuries, but finding consistent, quality sources has proven difficult

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There are new trends emerging out of the ingredient and nutritional supplement space, every day. Not surprisingly, these trends are typically driven by fluctuating consumer demand for new or more efficacious products that can help enhance specific end-points or work to improve overall health.

In addition to adapting to new trends and shifts in demand, it's important to understand that interest around specific ingredients tends to ebb and flow readily. An area that is observing a consistent increase in interest, at least as of late, is functional foods. Consumers are more readily looking for safe, consumable products that offer more than just sustenance. In fact, according to a recent market research report published by *Grand View Research*, "the global functional foods market size was estimated at USD 161.49 billion in 2018 and is anticipated to register a CAGR of 7.9% between 2019 – 2025" (Grand View Research, 2019). Various efficacious herbs and botanicals have emerged as functional foods, piquing consumer interest in this area even further.

One such botanical that has been in the spotlight is the efficacious Maca root.

Maca, otherwise known as *Lepidium meyenii* or *Lepidium peruvianum*, is a Peruvian botanical of the Brassicaceae family. It has been cultivated for more than 2,000 years in harsh weather conditions in the central Andes between 4,000 and 4,500 meters above sea level. The root has been used for centuries for its nutritional value and its ability to enhance fertility in humans and animals (Gonzales, 2011). Traditionally, following its harvest, Peruvian natives would naturally dry the maca roots, enabling storage for later use. When natives were prepared to use the maca, the roots would be boiled to soften them, after which juice from the root could be consumed (Gonzales, 2011).

While maca has been used in traditional Peruvian folk medicine for centuries, worldwide curiosity around the root increased dramatically in the 1990s and early 2000s, spurring amplified interest in studying the effects of maca in animals and humans. Initial animal studies focused on determining the root's impact on sexual function, sperm function, prostate function, serum hormone levels, female reproduction and memory/learning (Gonzales, 2011). In an effort to further validate several of the positive data end-points observed in the pre-clinical animal studies, human trials, specifically those focused on sexual and sperm function, energy production, metabolic syndrome and osteoarthritis, were conducted. Further research is still necessary to determine maca's mechanism of action, however, clinical trials have demonstrated marked, positive effects on sexual behavior, fertility, mood, memory and metabolism (Gonzales, 2011).

As the world continued to learn more about maca and its positive impact on a multitude of end-points, demand increased. Maca observed one of its highest peaks in demand in 2013, when Dr. Oz included it on his "Hot List" of energy boosting foods. Additionally, according to HerbalGram's 2013 report, maca was among 2013's best-selling botanicals, demonstrating its explosive growth with a 150% observed increase in sales over 2012 (Smith, 2015). Although global interest was on the rise, the surge in demand was replicated most notably in China, where natives were aggressively seeking out the botanical for its libido-enhancing properties and ability to positively impact longevity.

As if almost overnight, China became the leader of skyrocketing demand in 2013-2014. When they couldn't obtain enough of the botanical to meet their country's rising demand, China resorted to smuggling the fresh root out of Peru through Bolivia, which is considered biopiracy as it is illegal to export unprocessed maca out of Peru (Collyns, 2015). Theft of the root continued, and cultivation in China began– mainly in the Yunnan Province. However, one of the qualities that makes Peruvian maca so efficacious, is its growing conditions at high elevations in the Andes. In order to successfully grow the root in China, farmers had to resort to the use of pesticides, herbicides, etc. all of which impacted the toxicity levels of their maca. Additional pollution in China, more specifically high levels of heavy metals found in the water and soil, contaminated the Chinese maca further, making it less efficacious and even potentially dangerous (Smith, 2015).

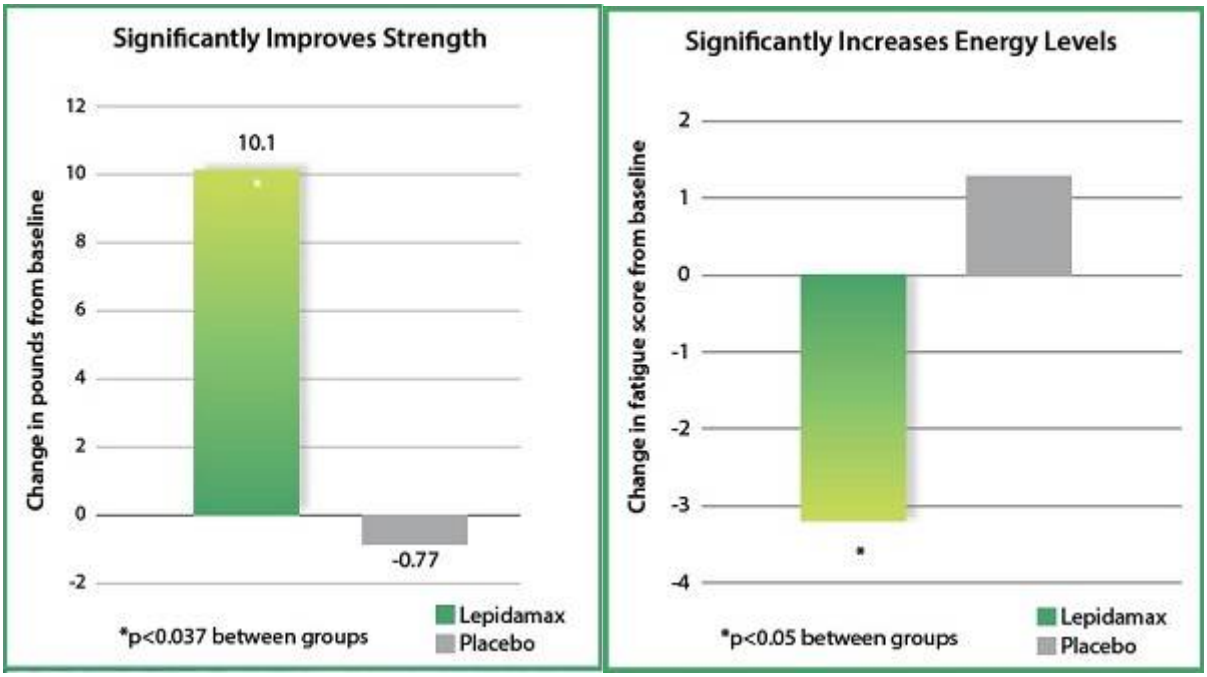
With new Chinese suppliers entering the maca marketplace, the industry observed a large fluctuation in pricing, with wholesale prices spiking and then dropping for both Peruvian and Chinese product. Additionally, as Chinese maca began making its way into consumer products, the efficacy of the botanical started to come into question, mainly because Chinese maca was found to be less efficacious than Peruvian maca. Chinese maca also lacked the clinical data that Peruvian maca so notably touted. According to one supplier, "Such intentional adulteration [of maca] has the potential not only to tarnish the image of reputable companies, but also to impact the effectiveness of such products" (Smith, 2015).

The maca market continued to swell from 2013 – 2014, but between 2015 and 2016 the demand and sales of Chinese maca started to fall dramatically. Aside from the lower quality and efficacy, by its origins, maca was a complicated plant to incorporate into traditional Chinese medicine, mainly because it never had a place there to begin with (Brand, 2016). This made adoption of the root more difficult and contributed to its eventual fall out of the Chinese spotlight.

With a previously volatile purchasing environment and years of illegal activity surrounding the history of maca in China, it's clear to see why distrust formed around their product. While there has been an observed decline in Chinese maca, the root is still considered a popular superfood and is continually being studied in both pre-clinical and clinical settings to identify additional beneficial endpoints. However, providers are much more knowledgeable now about the quality and sources and are careful to select where and whom they purchase from.

When considering the strong benefits associated with consistent use of maca, and thoroughly understanding the current agricultural environment surrounding the botanical, ingredient provider Nutrition 21 sought out to develop a high-quality, Peruvian sourced maca blend that could potentially deliver on the previously explored benefits, specifically those impacting men's health. To ensure sourcing of high-quality, nutrient-rich maca, Nutrition 21 collaborated with the University of Peru to obtain maca that is grown and processed in optimal conditions in the Peruvian highlands. Additionally, Nutrition 21 developed and studied various blends of Peruvian maca phenotypes and found one proprietary blend, now branded as Lepidamax™, with the greatest

efficacy. Clinical study results published in March of 2019, in the peer-reviewed *Journal of Exercise and Nutrition* , showed that Lepidamax significantly increased grip strength, energy levels and sexual function, in men. The clinical study protocol consisted of a randomized, double-blind, placebo-controlled, parallel group design consisting of 47 healthy subjects aged 18 years and older. Participants were provided a daily 2.1g dose of Nutrition 21's proprietary maca blend or a placebo for 28-days (Jiannine, 2019).



(Jiannine, 2019)

In a separate pre-clinical study, Lepidamax was also shown to increase skeletal muscle energy metabolism by enhancing a process known as mitochondrial biogenesis (Sahin K, 2018). To examine the molecular mechanism behind the energy-enhancing effects of its maca blend, Nutrition 21 measured various mitochondrial markers following exercise. Results showed that Lepidamax significantly enhanced the activity of these markers compared to control. These results support the beneficial effects of Lepidamax on enhancing endurance and energy metabolism and indicate that Lepidamax also has a unique mechanism to support physical endurance (Sahin K, 2018).

This is only one example of how the interest and knowledge around maca is growing, even now. As the natural product's industry continues to study and learn more about this efficacious root, there is no doubt that new, substantiated end-points will be uncovered. It is also obvious that with its turbulent history in the space, Chinese maca may no longer be considered a quality alternative for product developers, or even an option for some companies based on its lack of efficacy and potential toxicity. If you are looking for a quality maca provider, remember that the consistency and authenticity of the root, is key.

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