The zinc content in peanut seed is governed by its size and Ca and P nutrition

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Peanut is an important food legume of the tropical and subtropical world from where about 42 million tonne of its pods is produced annually. With its high-energy, protein and minerals, it has a unique place in human consumption world-wide, right from raw to several value added products and fortification with cereals. Zinc (Zn) is an essential nutrient and its deficiency has a strong impact on human health, but the Zn content in edible parts of most of the food crops is low world-wide mainly due to their cultivation on Zn deficient soils. As a result a large proportion of the population, in Asian and African countries, is at risk of Zn deficiency. Peanut is a good source of Zn and its consumption may be a solution to ensure its adequate level (Singh and Chaudhari, 2015). However, there is variation in seed size of peanut mainly depending on their pod size, soil type and phosphorus (P) and calcium (Ca) nutrition. Thus an effort was made to study the influence of P and Ca fertilizers on Zn concentrations in various seed size peanuts.

Thirty six peanut genotypes comprising of 14 small, 13 medium and 9 large size seeds were grown with P and Ca in a field for two years, in a medium black, calcareous clayey soil having 7.9 pH, 1.1 % organic carbon, 750 mg kg^{-1} total N, 8.5 mg kg^{-1} available P, 11 mg kg^{-1} heat soluble S, and 1.25 mg kg^{-1} DTPA Zn. The P at 50 kg P ha^{-1} as single superphosphate was applied as a basal and for Ca, 100 kg Ca ha^{-1} as gypsum was applied 30 days after sowing.

Table 1. Zn concentrations (mg kg^{-1}) in leaf, seed and shell of various seed-size peanuts influenced by Ca and P.
Where C is control, P is 50 kg P ha^{-1} and Ca is 100 kg Ca ha^{-1}

Seed sizes	Leaves				Seeds				Shells			
	C	P	Ca	Mean	C	P	Ca	Mean	C	P	Ca	Mean
Small	24	22	26	24	43	36	47	42	20	18	21	20
Medium	22	19	24	22	35	31	41	36	22	19	23	21
Large	22	20	25	22	40	35	43	39	24	21	26	24
Mean	23	20	25	23	39	34	44	39	22	19	23	21
LSD (0.05) Interactions		5				7				6		

The peanut genotypes grown with P and Ca showed a large variation in Zn content in their seed, leaf and shells of the produce (Table 1). The seed Zn content was high in small seeded genotypes (28-60 mg kg^{-1} mean 42 mg kg^{-1}) followed by large-seeded (33-48 mean of 39 mg kg^{-1}) and lowest in medium-seeded genotypes (22-46 mean of 36 mg kg^{-1}). Application of P decreased Zn in leaf, seed and shell irrespective of seed size, but application of Ca increased the Zn content in all these tissues with more pronounced effects in large-size seeds. The large-size seeds require more nutrients for attaining full seed growth and high Zn in their seed. Calcium, which is essential for seed filling, increased uptake of Zn from the soil to the seeds and hence is crucial for Zn-biofortification. Nine genotypes with >45 mg kg^{-1} Zn in their seed were also responsive to Ca fertilizers.
The study reveals that cultivation of high Zn-density peanut with Ca fertilizer and their consumption has the potential to improve the Zn adequacy in the diets of rural population, with a high risk of Zn-deficiency.

References

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