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EXTRACTION PROCESS FOR PRODUCTION OF PURIFIED CARNOSIC ACID AS A NATURAL ANTIOXIDANT

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According to Food and Drug Administration antioxidants are defined as "substances used to preserve food by retarding deterioration, rancidity, or discoloration due to oxidation". Because of these concerns, there has been an increasing interest in the use of natural antioxidants in food processing. Carnosic acid is the primary phenolic diterpene compound existing in rosemary plant. It is reported that in edible oils carnosic acid is significantly more effective than other natural antioxidants, as well as synthetic antioxidants such as BHA and BHT. It improves color stability and oxidation inhibition of processed meats and is readily soluble in edible oils. In this paper a process for the extraction of carnosic acid from rosemary plant is described. Acetone is used as a solvent due to its selectivity. It extracts all of the carnosic acid, while it extracts less of the undesirable components. The degree of extraction of the carnosic acid is greater than 90%, while the carnosic acid purity in the solids of the extract is between 20% and 30%. A water miscible solvent such as aqueous sodium carbonate is added to the extract to isolate the carnosic acid. Large amounts of impurities are made nearly entirely insoluble by adding additional water and the carnosic acid salt remains insoluble. The insoluble impurities are separated by filtration. The volatile compounds associated with the odor and taste of the spice is separated by liquid-liquid extraction with a suitable solvent such as hexane. So the carnosic acid salt remains in the aqueous phase. Then the solution is acidified to precipitate the purified carnosic acid and is removed by filtration. In this process due to this fact which acetone is a selective solvent and minimizes extraction of chlorophyll from the plant, and also using hexane extraction of the extract and finally avoiding heating of the process, the undesirable color and odor in the carnosic acid product is minimized [1-4].

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EFFECT OF COVER CROPS AND BIOFERTILIZERS ON RADIATION ABSORPTION AND USE EFFICIENCY OF SESAME (*SESAMUM INDICUM* L.)

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In order to estimate light extinction coefficient and radiation use efficiency of sesame a split plot arrangement of two factors based on randomized complete block design with three replications was conducted in 2009-10 growing season. Cultivation and no cultivation of *Lathyrus* sp. and Persian clover (*Trifoliumresopinatum*) as cover crop in autumn assigned to the main plots. The sub plot factor consisted of three different types of biofertilizers plus control, including 1-nitroxin (containing of *Azotobacter*sp.&*Azospirillum*sp.), 2- biophosphorPSB (containing of phosphate solubilizing bacteria,*Bacillus* sp. &*Pseudomonas* sp.)), 3- biosulfurSSB (containing of *Thiobacillus*ssp.) and 4- control (no fertilizer). The results showed that application of biofertilizers resulted to 15 days shorter period to achieve maximum leaf area index compared to control and as a result, the maximum fraction of absorbed radiation and consequentlysesame dry matter produced at the sixtieth day after emergence, 15 day sooner than control. Sesame dry matter production after cover crops cultivation was 19 percent higher than no cover crop cultivation treatment. Although, light extinction coefficient in control (no biofertilizer) was higher than biofertilizer treatments (0.78 vs. 0.69), but radiation use efficiency (RUE) in nitroxin and biosulfurwas higher compared to control (1.76 , 1.75 and 1.63 respectively) which resulted to highest biological and seed yield and harvest index. Sesame radiation use efficiency in plots with cover crop was 0.12 higher than plots with no cover crop. In this research, the total mean sesame RUE estimated of 1.68 gMJ^{-1} (R^2=0.95). In general, these results indicated that application of nitroxin and biosulfur combined with cover crops cultivation enhanced utilization of radiated and absorbed radiation by sesame canopy and consequently improved yield.