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XANTHOCERAS SORBIFOLIUM (YELLOWHORN) SEED GERMINATION AND PHYSIOLOGICAL INDEX TEST

Biodiesel is renewable energy which is made from oil-bearing crops, oil plants, or animal fats, discarded restaurant oil, and is a high-quality diesel substitute. Biodiesel is a typical "green energy", and development of biodiesel has great significance on sustainable economic development, which also promotes alternative energy, in order to reduce the pressure on environment, and control the urban air pollution[1].

China as the representative of a large number of developing countries is accelerating the process of industrialization. With increasing demand for energy, people clearly realize that oil is no longer the inexhaustible resources of the underground[2]. *Xanthoceras sorbifolium*, is an oil bearing crop with resistance to drought or cold weather and barrenness, as a large flowering shrub or small tree, is original grown in China[3], and has enormous development potential as a biological oil ram material. Chinese government starts to build *X. sorbifolium* resource base, to produce biological kerosene, in order to change Chinese energy resource structure, to reduce the dependency on petroleum.

Seed germination capability is essential to seed quality, also a key to large acreage planting. However, seed germination is a problem for the nursery production of *X. sorbifolium*, which is difficult because of the hard, dense and poor water permeability seed coat which hinders regular germination of these seeds.

This study initially looked at overall seed quality by measuring the thousand kernel weight (TKW), seed viability, crude fat and fatty acid content of the seed.

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[1] Han, D.Q., Xu, G.Y., Xu, H.L. & Liu, H.L. (2002). Current situation and development prospect of Biodiesel, International petroleum economics, 2, 70-73.

[2] Liu, J.B., (2009). A brilliant future of biodiesel, New material industry, 8, 28-31.

[3] Xu, Q.P., Ma, M.X. & Ma, C.D. (2006). Research of *Xanthoceras sorbifolia* seed Germination Property, Shanxi Agricultural Science, 3, 62-64.

Germination tests were then researched as fellows: water treatment by soak seeds in water with initiation temperature of 80^{o}C, naturally cool down under room temperature at 22^{o}C for 24hours; mechanical treatment by cutting or remove seeds coat, and chemical scarification by soaking in concentrated sulphuric acid (H_2SO_4) for 2, 4 and 6hours. Seed were incubated at constant temperature of 30^{o}C, and a relative humidity of 30%, with light from 7am to 11pm. By measuring the germination rate, germination energy, germination index and vigour index, and statistical analysis by SPSS, it was determined how a treatment affected the *X. sorbifolium* seed germination.

Seed quality tests showed that *X. sorbifolium* seed sample is qualified for use as a secondary oil raw material and for making biodiesel. Our results showed that by completely removing seeds coat, can increase the seed germination rate, which accomplished maximum germination in 10 days with 97% germination percentage. Water and chemical treatments also shows potential, as *X. sorbifolium* seed germination was 22 and 33% respectively with these treatments compared to the control treatment (without any treatment) of 9%.

For promoting *X. sorbifolium* seed germination, the method of removing the seeds coat is recommended. However, mechanical treatment could be labour intensive for mass nursery production, so chemical treatments or the combination of water and mechanical treatments could be adopted as an alternative. Further investigation is necessary to support this finding and to investigate more efficient seed coat removal method. Also more research is needed to improve seed germination, and could handle the issue of *X. sorbifolium* seeds which was not in the scope of this research (e.g. temperature and light effects) on the seed.