



NATURAL EXTRACTS FOR FINGERPRINT DEVELOPMENT

¹ Vishwatej Gade, ² Vikram Hankare

¹ Student ² Assistant Professor

Department of Forensic Science

Yashavantrao Chavan Institute of Science, Satara, India.

Abstract : Fingerprint evidence are perhaps the most common type of physical evidence found at crime scene. Their development and identification help to prove criminal physical presence at scene of crime. It is extremely difficult for a criminal to commit the crime without leaving behind his fingerprint. The latent fingerprints are the most pronounced category of fingerprints which are found on a crime scene. Latest development in the field of fingerprint development methods has brought front various powders which are cost effective, non-toxic and easily available. This review paper lists down some powders extracted from natural products (i.e., flowers, herbs, fruits, etc) which provides a quality result on porous as well as non- porous surfaces.

IndexTerms - fingerprints, development, natural extracts, natural powders

I. INTRODUCTION

“Fingerprints” a combination of loops, whorls, arches, deltas, ridges and other physical characteristics of fingers are used for persons individual identification. Chance prints generally known as latent fingerprints are invisible in nature and mostly found on a crime scene. There are various methods used for the development of fingerprint. [1] Dusting method (the traditional method) is one of the best and easiest method used for development of the chance prints on a crime scene. [2] Various types of powders are available according to the surface (porous, non- porous), colour of surface, environmental conditions, magnetic powders, fluorescent powders, powders from nanoparticles, etc. [3] The commercial powders are sometimes hazardous to human health, the organic powder made from natural extracts are non-toxic, cost effective and are easily extracted from the natural products.

Powders extracted from natural products are listed down: -

- Sweet Potato Powder
- Turmeric Powder
- Rice Husk Powder
- Gambir Powder
- Rose and Hibiscus Powder

1. SWEET POTATO POWDER

The Anthocyanin pigment is responsible for the deep purple and reddish-purple colour of a sweet potato. Anthocyanin in the sweet potato shows action of antioxidant. The purple sweet potato contains anthocyanin and peonidin glycoside which have a higher action of antioxidant than in the red sweet potato where pelargonidin-3-routineside-5-glucoside type is found. A number of sizes between 60 to 200 mesh of purple sweet potato were used. Brownish purple results were obtained with clear colour contrast at 100 and 200 mesh sizes of purple sweet potato. The fingerprints were clearly developed on the non-porous surface i.e., aluminium foil and CD. [4]

2. TURMERIC POWDER

Turmeric is a rhizomatous herbaceous perennial plant of the ginger family ‘Zingiberaceae’. On the latent prints, the adherence of turmeric powder takes place because of the hydrogen bonds formed between the fatty acids/ glycerides of sebum. The reaction of carbonyl group and hydroxyl group of the curcumin component also takes place. 1,7-bis-(4-hydroxy-3-methoxy-phenyl)-hepta-1,6-diene-3,5-dione (curcumin) the colouring principle and the derivatives of desmethoxy and bis-desmethoxy in varying proportion are present in the powder. Due to lack of contrast, the latent prints present on skin cannot be developed clearly compared to other surfaces. [5]

3. RICE HUSK POWDER

With the help of Thermochemical treatment the synthesis of silica nanoparticles (SNP) from the rice husk is done by addition of natural dyes. Field emission scanning electron microscope, Fourier-transform infrared spectroscopy, X-ray diffraction analysis are performed to record and characterize the photoluminescence of the powder. The powder in which curcumin pigment was added to the silica nanoparticles showed strong fluorescence and better stability. No compromise to the efficiency of coloured silica nanoparticles was done during the dye doping process. The latent prints on non- porous surfaces can be developed without and quality compromise. [6]

4. GAMBIR POWDER

Gambir a traditional natural herb generally found in Sri Lanka, Indonesia and Malaysia is extracted from the leaves and twigs of *Uncaria Gambir* Roxburgh plant. It is used as a medicine for inflammatory skin diseases and relieve headaches and also used in textile dyes and tanning agents. The green powder of gambir plant is used to visualize the latent fingerprint. The size of 0.250mm resulted a better quality visualization of latent fingerprint on the non- porous surfaces. [7]

5. ROSE & HIBISCUS POWDER

Natural extracts like rose and hibiscus are used because they are inexpensive, non-toxic, easily available, have better adhesive property. The carcinogenic disadvantages and side effects of conventional chemical powders can be avoided using the naturally extracted powder. After shedding off and drying the flower petals, they were crushed to fine powder using a mortar pestle. The contrasted background produced excellent results of hibiscus petals powder. Rose powder was opaque on every surface other than glass and ceramic. [8]

II. CONCLUSION

The importance of fingerprint development is to help investigators link one crime scene to another involving the same person. With the advancement of technology new methods are being developed for fingerprints development. One of them is using natural extracts powder to develop latent fingerprints. This review paper gives the information about the natural extracts powder used in the fingerprint development. This information will be useful for forensic scientists and other private investigators to develop latent fingerprints found on a crime scene.

III. ACKNOWLEDGMENT

The authors are thankful to the Department of Forensic Science, Yashwantrao Chavan Institute of Science, Satara, India for the beneficial and helpful guidance and cooperation.

REFERENCES

- [1] L. C. M. P. S. M. Champod C, "Fingerprints and Other Ridge Skin Impressions," *CRC Press*, 2004.
- [2] B. H. & H. H. Zijie Qiu, "A general powder dusting method for latent fingerprint development based on AIEgens," *Science China Chemistry*, 2018.
- [3] B. Wilshire, "Advances in fingerprint detection," *Endeavour*, 1996.
- [4] Y. S. J. M. a. T. J. Sri Adelila Sari, "A new latent fingerprint method using natural powder purple sweet potato (*Ipomoea batatas* L. Poiret)," *The Eighth National Symposium and the Fourth International Symposium*, 2020.
- [5] H. K. R. K. Rakesh K. Garg, "A new technique for visualization of latent fingerprints on various surfaces using powder from turmeric: A rhizomatous herbaceous plant (*Curcuma longa*)," *Egyptian Journal of Forensic Sciences*, 2011.
- [6] Y. Z. S. S. N. F. N. H. Revathi Rajan, "Fluorescent variant of silica nanoparticle powder synthesised from rice husk for latent fingerprint development.," *Egyptian Journal of Forensic Sciences*, 2019.
- [7] H. N. J. A. K. N. A. M. Sri Adelila Sari, "Development of Gambir Powder as a cheap and green fingerprint powder for forensic application.," *AIP Conference Proceedings*, 2019.
- [8] V. A. S. L. P. K. B. M. V. N. A. S. A. S. K. K. A. M. S. S. Vanisha Godara, "Comparitive Study of Rose and Hibiscus Petals Powders in Latent Frictios Ridges Analysis.," *Problems of Forensic Sciences*, 2022.
- [9] H. K. R. G. R. K. Kumari, *Egyptian Journal of Forensic Sciences*, 2011.
- [10] V. A. V. G. P. K. V. N. P. P. P. R. L. C. A. S. K. K. A. M. S. S. N. K. G. K. S. Sneha Lohar, "Comparative study of development of latent fingerprint by using cost effective waste materials.," *Materials Today: Proceedings*, 2022.
- [11] A. K. K. Richa Rohatgi, "New Visualizing Agents for Developing Latent Fingerprints on Various Porous and Non-Porous Surfaces Using Different Household Food Items.," *Asian Journal of Science and Applied Technology*, 2014.
- [12] P. V. G. C. Mia R, "Using Salt & Sugar Powder to Development Hidden Fingerprint Impressions at the Crime Scene.," *International Journal of Forensic Sciences (IJFSC)*, 2021.
- [13] R. K. R. K. G. Harish Kumari, "New visualizing agents for latent fingerprints: Synthetic food and festival colors.," *Egyptian Journal of Forensic Sciences*, 2011.