

**UNIVERSITI TEKNOLOGI MARA**

**COMPARATIVE STUDY OF FERROUS SULPHATE  
AND PHOSPHOTUNGSTIC ACID MORDANTS IN  
ENHANCEMENT OF CYTOLOGICAL NATURAL  
DYES EXTRACTED FROM *BOUGAINVILLEA  
SPECTABILIS* AND *DIANTHUS CARYOPHYLLUS***

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Project submitted in fulfilment of the requirements for the degree of  
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## **DECLARATION**

I hereby declare that this thesis is my original work and has not been submitted previously or currently for any other degree at UiTM or any other institutions.

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## ABSTRACT

Staining of the nucleus is crucial in detecting the cancerous cells. In cytopathology, the nucleus was stained by hematoxylin which derived from logwood, *Haematoxylum campechianum*. *Bougainvillea Spectabilis* (paper flower) and *Dianthus Caryophyllus* (carnation) have shown the staining ability towards the nucleus in the previous study. In order to apply a good fixation of the dye onto cells, a suitable mordant has to be selected. The different mordant used will give a different shade of color and color resistance to fading properties. Therefore, the aim of this study is to identify the most functional mordant between phosphotungstic acid and ferrous sulphate in color enhancement of *Bougainvillea Spectabilis* and *Dianthus Caryophyllus*. There were four parameters performed which were pH, concentration, qualitative microscopic evaluation and quantitative color intensity measurement (MIPAR software). Based on the result, ferrous sulphate enhance the staining quality better on *Dianthus Caryophyllus* than *Bougainvillea Spectabilis* with 4.4 pH, 16.75% concentration, Fair agreement and 163.35 pixels. Phosphotungstic acid mordant was not enhancing the staining quality from both *Dianthus Caryophyllus* and *Bougainvillea Spectabilis* dyes extract. All extracted dyes from both flowers without mordant and incorporated with phosphotungstic acid resulting in poor agreement in qualitative microscopic evaluation. Only *Dianthus Caryophyllus* incorporated with ferrous sulphate gave the highest agreement in qualitative microscopic evaluation. In conclusion, *Dianthus Caryophyllus* gave a good staining quality, although it is incomparable to control Papanicolaou (PAP) stain. Thus, further study of different types of mordant on *Dianthus Caryophyllus* and *Bougainvillea Spectabilis* dyes extract should be performed.

Keywords: *Bougainvillea Spectabilis* (paper flower), *Dianthus Caryophyllus* (carnation), ferrous sulphate, phosphotungstic acid, mordant