

## The staining ability of natural flower extracts as alternative dyes for bacterial staining

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**Introduction:** Gram staining is used as a routine stain in bacteriology. Synthetic stains are commonly used for Gram staining which were reported to cause adverse effects to the environment and user. The use of natural dyes for microbial staining could be eco-friendly and non-toxic. As a result, plant-derived dyes are proposed as alternative stains for staining microorganisms.

**Objective:** To investigate the potential of *Thunbergia erecta* and *Clitoria ternatea* flower extracts as alternative dyes for bacterial staining.

**Methodology:** *T. erecta* and *C. ternatea* flowers were dried and ground to get powder. Powdered petals were macerated with 90% methanol. The mixture was filtered and subjected to rotary evaporation under reduced pressure at 40°C to obtain the crude extract. Extracts were used to prepare primary and counterstains. The staining abilities of all the stains were studied at different temperatures, times and finally with colour intensifiers and mordants. Gram staining was done using the optimum conditions obtained from simple staining such as room temperature as temperature and a staining time of 2 minutes along with mordant copper sulphate. Stained slides were examined under the microscope and the staining quality of stains was scored as Poor (1), Good (2) and Excellent (3). Obtained data were analyzed using the Statistical Package for Social Sciences (SPSS).

**Results:** Staining of bacteria using a primary stain prepared from *C. ternatea* showed a staining score of 2 in simple staining at room temperature for 2 minutes with copper sulphate as a mordant. Furthermore, results indicated that primary and counter stains prepared from *T. erecta* and counter stain prepared from *C. ternatea* did not produce good results in simple and gram staining when compared to control stains.

**Conclusion:** The primary stain prepared from *C. ternatea* stains bacteria well when compared to the counter stain prepared from *C. ternatea* and the primary and counter stains prepared from *T. erecta*. However, the efficacy of the staining is not up to the satisfactory level for gramstaining when compared to the conventional gram staining dye.

**Keywords:** Staining, *Thunbergia erecta*, *Clitoria ternatea*, Simple staining, Gram staining