

**CYTOGENETICAL STUDIES ON SOME
MEMBERS OF THE FAMILY ASTERACEAE
OF NEPAL**



**A THESIS SUBMITTED TO THE
CENTRAL DEPARTMENT OF BOTANY
INSTITUTE OF SCIENCE AND TECHNOLOGY
TRIBHUVAN UNIVERSITY
NEPAL**

**FOR THE AWARD OF
DOCTOR OF PHILOSOPHY
IN BOTANY**

**BY
PUSHPA KARNA (MALLICK)
NOVEMBER, 2014**

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LETTER OF APPROVAL

Date:

On the recommendation of Associate Prof. Dr. **Laxmi Manandhar** and Associate Prof. Dr. **Buddha Laxmi Vaidya**, this Ph. D. thesis submitted by **Pushpa Karna (Mallick)**, entitled “**Cytogenetical Studies on Some Members of the family Asteraceae of Nepal**” is forwarded by Central Department Research Committee (CDRC) to the Dean, IOST, T. U.

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DECLARATION

Thesis entitled **Cytogenetical Studies on Some Members of the Family Asteraceae of Nepal** which is being submitted to the Central Department of Botany, Institute of Science and Technology (IOST), Tribhuvan University, Nepal for the award of the degree of Doctor of Philosophy (Ph.D.), is a research work carried out by me under supervision of Associate Prof. Dr. Laxmi Manandhar, Central Department of Botany, Tribhuvan University and co-supervised by Associate Prof. Dr. Buddha Laxmi Vaidya, Tri-Chandra Multiple Campus, Tribhuvan University.

This research is original and has not been submitted earlier in part or full in this or any other form to any university, here or elsewhere, for the award of any degree.

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Pushpa Karna (Mallick)

LETTER OF RECOMMENDATION

This is to recommend that **Pushpa Karna (Mallick)** has carried out research entitled “**Cytogenetical Studies on Some Members of the Family Asteraceae of Nepal**” for the award of Doctor of Philosophy (Ph.D.) in **Botany** under our supervision. To our knowledge, this work has not been submitted for any other degree.

She has fulfilled all the requirements laid down by the Institute of Science and Technology (IOST), Tribhuvan University, Kirtipur for the submission of the thesis for the award of Ph.D. degree.

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.....
Pushpa Karna (Mallick)
November, 2014

ABSTRACT

Karyotypic studies of 45 taxa belonging to 33 genera in 10 tribes of the family Asteraceae are reported from Nepal. Chromosome number in somatic cells are recorded to be $2n=20$ in *Ageratum conyzoides* and *Taraxacum officinale* ; $2n=18$ in *Ageratum houstonianum*, *Blumea lacera*, *Blumea laciniata*, *Dichrocephala integrifolia*, *Rhynchospermum verticillatum*, *Sonchus asper* and *Sonchus arvensis*; $2n=32$ in *Artemisia indica*, *Blumea lacera* var. *glandulosa* and *Xanthium strumarium* ; $2n=34$ in *Artemisia vulgaris*, *Cirsium arvense*, *Parthenium hysterophorus*; $2n=36$ in *Artemisia abrotanum*, *Aster ageratoides*, *Bidens pilosa* var. *minor*, *Chrysanthemum morifolium*, *Spilanthes acmella*, *Spilanthes calva*, and *Senecio laetus*; $2n=28$ in *Anaphalis triplinervis* var. *triplinervis*, *Calendula officinalis* and *Gnaphalium purpureum* ; $2n=16$ in *Crepis japonica*, *Erigeron annuus*, *Galinsoga parviflora* and *Ixeris Polycephala* ; $2n=14$ in *Gnaphalium affine*; $2n=22$ in *Blumea fistulosa*, *Blumea mollis*, *Conyza canadensis*, *Eclipta prostrata* and *Stevia rebaudiana*; $2n=40$ in *Aster barbellatus*, *Aster peduncularis* subsp. *nepalensis* and *Crassocephalum crepidioides*, $2n=26$ in *Coreopsis grandiflora* and *Tridax procumbens* ; $2n=24$ in *Tagetes patula*, *Centaurea cyanus* and *Zinnia elegans* ; $2n=50$ in *Eupatorium adenophorum* and $2n=30$ in *Wedelia wallichii*. Meiotic studies are done in floral buds of 20 species. Lowest haploid chromosome in *Crepis japonica* ($n=8$) and highest in *Crassocephalum crepidioides* ($n=20$) are found in present study. The highest pollen stainability was found in *Galinsoga parviflora* (98.9 %) and lowest in *Stevia rebaudiana* (61.3%). Chromosome number for the four taxa *Aster peduncularis* subsp. *nepalensis*, *Aster barbellatus* , *Artemisia indica* and *Senecio laetus* are reported for the first time in this study. For the eleven taxa viz. *Ageratum conyzoides*, *Ageratum houstonianum*, *Blumea fistulosa*, *Blumea lacera* var. *glandulosa*, *Cirsium arvense*, *Erigeron annuus*, *Eupatorium adenophorum*, *Spilanthes acmella*, *Spilanthes calva* and *Xanthium strumarium* new chromosome number have been added. The chromosome counts for 41 taxa in this study are new for the flora of Nepal.

LIST OF ACRONYMS AND ABBREVIATION

| | |
|---------------|------------------------------------|
| A-I | Anaphase I of meiotic division |
| A-II | Anaphase II of meiotic division |
| C. Nepal | Central Nepal |
| CE. Nepal | Central and Eastern Nepal |
| cm | Centimeter |
| <i>et al.</i> | Et alli (L., and others) |
| E. Nepal | Eastern Nepal |
| m | Meter |
| msl | Meters from sea level |
| M-I | Metaphase- I of meiotic division |
| M-II | Metaphase- II of meiotic division |
| PMC | Pollen mother cell |
| sp., sps. | Species |
| TF% | Total form percentage |
| T-I | Telophase I of meiotic division |
| T-II | Telophase II of meiotic division |
| V. N. | Voucher number |
| W. Nepal | Western Nepal |
| WC. Nepal | Western and Central Nepal |
| WCE. Nepal | Western, Central and Eastern Nepal |
| μ | Micron |

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