Summary

In this research work, two cultivars were taken namely, *chamomile* (*Chamomile recutita*) and *Safed musli* (*Chlorophytum borivilianum*) were grown in control and intercropping pattern in rabi and kharif season separately. Both the cultivars have medicinal value and *C. recutita* has medicinal and aromatic value both.

*Chamomile recutita* belongs to the family *Asteraceae (Composite)* is an important medicinal and aromatic plant and also have natural source of essential oil (blue oil). On the basis of oil, *Chamomile* are of three groups, i.e. *Chamaemilum nobilis, Ormenis multicaulis* and scented Mayweed or Blue *chamomile recutita*. Presently, it is familiar as German *Chamomile*. It is wildly cultivated through the 40 countries in the world. It has pleasant aromatic odor and better test. The *Chamomile* oil is extensively use in herbal and homeopathic medicinal aromatherapy and massage therapy. The *Chamomile* flowers, petals and pollens have separate market value. It finds use in food industry, pharmaceutical, cosmetic industries and biological weed control.

On the other hand safed musli *C. borivilianum* species belong to the family *Liliaceous* and grows as wild plant in rainy season on the sloppy lands. Dry roots of this herb has aphrodisiac properties and is used several Ayurvedic medicine. The present study entitled “*A New Mediculture Cropping Patterns and Isolation of Chemical Constituents of Some Important Medicinal and Aromatic Plants in Bundelkhand region***” was carried out together information on the following aspects.
1. Intercropping *Chamomile recutitia* with chick pea

Intercrop and control crop taken in rabbi season in the year 2005, 2006 and 2007 separately. Data were recorded on eight yield contributing characters i.e. plant height (cm), branches/plant, spread area (sq cm), area of capitula (cm), fresh weight of capitula, Dry weight of capitula g/plant, oil content (%) and oil yield g/plant. All the growth parameters increased in every step as well as in every year 2005-2007 when *Chamomile* taken as intercrop with chickpea in comparison to the control *Chamomile* (Table1- 2, 5, 6, 9 and 10). It is concluded that *Chamomile* being a intercrop taken up extra nitrogen from the Chick pea root nodules. Thus in the availability of extra nitrogen to the intercrop (*C. recutita*), all the growth parameters increased in rich amount.

2. Isolation of composition of essential oil of *Chamomile recutita* control and its intercropping with chickpea

The essential oil isolated from control *Chamomile* and intercrop *Chamomile* of three parts of the plant i.e. capitula (flower), shoot and root separately. The oil amount was found increased quantities in every part of the plant of intercrop *Chamomile* in comparison to the control *Chamomile* plants in every year 2005, 2006 and 2007. After the isolation of essential oil, the identification of the components was done through GC. analysis of separate part of the plant. The total 55 compounds identified in the isolated oil (Table- 3, 7 and 11). The major compounds in the oil of the capitula were as, champhene, 6-methyl-5-heptane-2-one, (E)-β-fersenene, γ-muuroliolene, (E)-α-fernensene, γ-cadinine, δ-cadinine, (E)-nerolidol, hexadec-11-yn-13-15-diene, α-bisabolol oxideB, α-bisabolol, chamazulene, α-bisabolol oxide A, cis-en-yn-
dichloether and trans-en-yn-dicycloether obtained in the increased quantities in intercrop *Chamomile* and champhor, nerol, (E)-α-fernesane, γ-cadinine, δ-cadinine, α-bisabol oxide, and α-bisabolol were also obtained two times higher in intercrop *Chamomile* flowers in comparison to the control *Chamomile* flowers. The two constituents (limonene and gernyle acetate) obtained only in intercrop *C. recutita* flowers (Table- 3, 7 and 11). The oil were also isolated from the shoots of the control *C. recutita* and intercrop *C. recutita* were also found in rich amount in intercrop *C. recutita* in comparison to the control *C. recutita*. Consequently, nine compounds, viz. myrecene, cis-3-haxanyle acetate, P-Cymene, limoline, artimisia ketone, γ-ternolene, linalool and isoburinol, were found in extra amount intercrop *C. recutita* shoots in comparison to the control *Chamomile* shoots.

On the other hand two, compounds, artimesia alcohol and terpinolene were also found in increased quantities in intercrop *C. recutita* roots in comparison to the both control *Chamomile* and intercrop *Chamomile* shoots (Table- 3, 7 and 11). Therefore, the amount of chemical constituents as well as increased amount was found in intercrop *C. recutita*. Hence, this intercropping pattern recommended to the farmer of the Bundelkhand region to gain dual profit with main pulse crop of Chickpea. Thus, farmers’ status of Bundelkhand region will be economically strong. On the other hand Chickpea is a main pulse crop in Bundelkhand region of rabi season. It has nitrogen fixation in its roots nodules thus extra nitrogen supplied of intercrop *C. recutita* through nitrogen fixation root nodules of Chickpea. It has been concluded that this intercrop *C. recutita* flower (capitula), shoots and roots became in rich amount of chemical constituent as well as soil become rich in fertility which is used for incoming crop cultivation. The farmers of Bundelkhand region would be
risen two crops within one season without any loss in the yield which will be another profit for the farmer of Bundelkhand region.

3. Intercropping pattern of Safed musli with maize, bottleguard and pigeonpea

Intercropping of Safed musli was taken with maize, bottle guard, pigeon pea separately during the kharif season in the year 2005, 2006 and 2007. Data were recorded on twelve yield contributing characters i.e. number of leaves/plant, leaf length (cm), leaf width (cm), number of well developed root/plant, number under developed roots/plant, length well developed roots (cm), length of main root, fresh roots weight/plant, dry roots weight/plant, carbohydrate content, protein content and saponine content. All the yield contributing characters in three different intercropping patterns one increased in every year in comparison to the control Safed musli. It has concluded that in various types of intercropping patterns, Safed musli grown with Pigeon pea showed very good response in comparison to the others, maize and bottle guard co-cultivation (Table- 4, 8 and 12) and also showed good results in maize intercropping but poor response showed in bottle guard intercropping (Table- 4, 8 and 12).

On the other hand, three major chemical constituents (saponin, carbohydrate and protein content) were isolated from Safed musli in increase quantities which obtained by different intercropping (maize, bottle guard and pigeon pea) patterns in comparison to the control. The major chemical constituent obtained in intercropping Safed musli were very much higher in comparison to the control Safed musli in all the three intercropping patterns but the Safed musli obtain from the intercropping with pigeon pea had very much in higher amount of aforesaid major chemical constituents,
followed by maize and bottle guard. It has been concluded that all growth parameters including chemical constituent were increased in intercropping Safed musli because there are two reasons, (i) more shed occupied by pigeon pea for the protection of the sunlight. Thus, all growth parameters as well as chemical constituents became higher. On the other hand, maize occupied less shed in comparison to the pigeon pea, therefore, all growth parameters as well as chemical constituents were increased in low amount followed by bottle guard, (ii) it has been suggested that pigeon pea is a leguminous crop, which supply nitrogen for the growth of Safed musli. Therefore, the major chemical constituents as well as all growth parameters increased in higher amounts in comparison to the other intercropping patterns, maize, and bottle guard.