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# Comparative ultra violet spectroscopy of ethanolic flower extracts of morphotypes of *Hibiscus rosa-sinensis* Linn.

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**Abstract**
*Hibiscus rosa- sinnensis* Linn. (Malvaceae) is widely grown as an ornamental and medicinal plant. The flower of *Hibiscus rosa-sinnensis* Linn. possess various medicinal activity such as anti - convulsents, antidiabetic, antipyretic, antioxidant, antifertility, antidiarrheal. The present work deals with the nature of the UV absorption of ethanolic extract of morphotypes of *Hibiscus rosa sinensis* Linn. The UV spectroscopy of ethanolic flower extract of four tested morphotypes of *Hibiscus rosa -sinensis* Linn. have shown the presence of carbonyl (ketone), α-β unsaturated amide and lactam, flavones, chalcones and anthocynin types of flavonoids which are common in all morphotypes. These chromophoric groups and flavonoids are responsible for medicinal utility of the morphotypes.

**Keywords:** *Hibiscus rosa-sinensis*, morphotypes

## Introduction
A medicinal plant is described as a plant which has in its parts bioactive agent which are used for therapeutic purposes or precursor for the synthesis of useful drugs (Omodara *et al.* 2012). Medicinal plants are the richest bio resource of drugs for traditional systems of medicine; therefore man has been using plant extracts to protect himself against several diseases and also to improve his health and life style (saxena and saxena, 2012) [20]. India is one of the national blessed with a rich heritage of traditional medicinal systems and rich biodiversity to complement the herbal need of the treatment administered by these traditional medicinal systems. The recognized Indian systems of medicine are Ayurveda, Siddha and Unani, which use agro-climatic zones, 4700 plant species of which 1500 are reported to have medicinal properties varying degrees (Jadhav *et al*., 2009) [9].

*Hibiscus rosa- sinnensis* Linn. known as china rose is an important medicinal plant. It belongs to family Malvaceae that comprise around 82 genera and over 1500 species distributed all over the world in warm temperate and tropical region (Lawrence, 1969; Gupta, 1981) [14, 6]. It is an evergreen woody glabrous showy shrub with about 1.5-2.5 m height. Leaves are coarsely toothed above and entire below ovate bright green and 3 nerved base. The flowers are axillary solitary companulate. (Kaushik *et al*., 1999) [10].

Several articles and ancient literature have been shown that the flowers of this plant possess antifertility activity (Pekamwar *et al.*, 2013) [18]. Flower is used for treatment of inflammation (Kritikar and Basu, 1984) [11] and menorrhagia (Nadkarni, 1998).Flower buds are taken row for relieving stomach pain (Maheshwari, 2000) [15]. The flower of *Hibiscus rosa sinensis* Linn. possess various activity such as anticonvulsants, antidiabetic, antipyretic and antioxidant (Agrawal *et al.*, 2012). Flower is made into paste and given to treat irregular menstruation (Retnam *et al.*, 2006) [19]. Young leaves used for wound healing and treatment for dandruff (Trivedi, 2010). Ethanolic flower extract shows antihyperlipidemic activity (Sikarwar and Patil, 2015) [21]. The juice of the fresh root is given for gonorrhea (Caius, 1986) [3].

On the other hand, the ancient Indian medicinal literature that the flowers of *Hibiscus rosa- sinnensis* Linn. have beneficial effect in heart diseases, mainly in myocardial ischemic diseases, due to its enhancement of the myocardial endogenous antioxidants by an adaptative response and without producing any cytotoxic effects (D. Peer Basha *et al*., 2013). In present research work four morphotypes of *Hibiscus rosa -sinensis* Linn. are selected.

Morphotype I (*Hibiscus* Red) - Red flower with 5 petals
Morphotype II (*Hibiscus* Pink) - Pink flower with 5 petals
Morphotype III (*Hibiscus* Yellow) - Yellow flower with 5 petals
Morphotype IV (*Hibiscus* White) - White flower with 5 petals (Kaushik *et al*., 1999) [10].

(a) (b) (c) (d)

**Fig 1:** Morphotypes of *Hibiscus rosa- sinnensis* Linn. (a) *Hibiscus* Red; (b) *Hibiscus* Pink; (c) *Hibiscus* Yellow; (d) *Hibiscus* White.

## 2. Material and methods

### Collection and preparation of extract

For present investigation the plant material of *Hibiscus rosa sinensis* Linn. (Flower and leaves) were collected from D.A.V.V. campus Indore and Apna garden vishnupuri Indore. The collected plant material was identified with the help of Flora of British India (Hooker J.D., 1875).

To obtain ethanolic extract 100 gms of shade dried plant material was extaract with 500 ml of ethanol (95%) in "Soxhlet Extraction apparatus". Finally the prepared plant was macerated with water for 24 hrs. to obtain aqueous extract. The extract was concentrated by distilling off the solvent (Kokate, 1994; Kokate *et al.*, 1993) [12, 13].

### Spectroscopic analysis

The extract thus obtained was than subjected to UV spectroscopy for identification of various flavonoids and chromophoric group. To detect the UV spectra profile of extracts of morphotypes of Hibicus rosa sinensis plant, the extract were scanned in the wavelength ranging from 200-400 nm by using UV spectrophotometer (Shimadzu UV 1800) and peaks were detected (Dyer, 1987; Sliverstein *et al.* 1991; Bohm, 1998; Harborne 1975) [2, 7].

## 3. Result and discussion

### Morphotype I (*Hibiscus* Red)

In UV spectrum the absorption data shows the weak band at 340 nm which is the characteristic of aromatic nature of compound and presence of flavonoids - flavone.

The broad absorption band at 282 nm reveals the presence of carbonyl group, Kaempferol, Flavone and anthocynin. Appearance of strong band at 223 nm is characteristics of carbonyl group (ketone), 2-octyne and presence of chalcone.

The absorption band at 216 nm display methyl vinyl ketone. The three characteristics band at 209 nm, 208 nm and 205 nm shows the presence of Amido-acetamide, alkyne-polyyes-2, 4, 6 – octatriyne and carboxylic acid.

Spectrum shows absorption bands in the region 200-220 nm which indicates the presence of α-β unsaturated amides and lactam.

From the UV spectroscopy it is concluded that Flavone, kaempferol, anthocynin and chalcone types of flavonoids are present in red flower (Fig No. 2, Table No. 1).

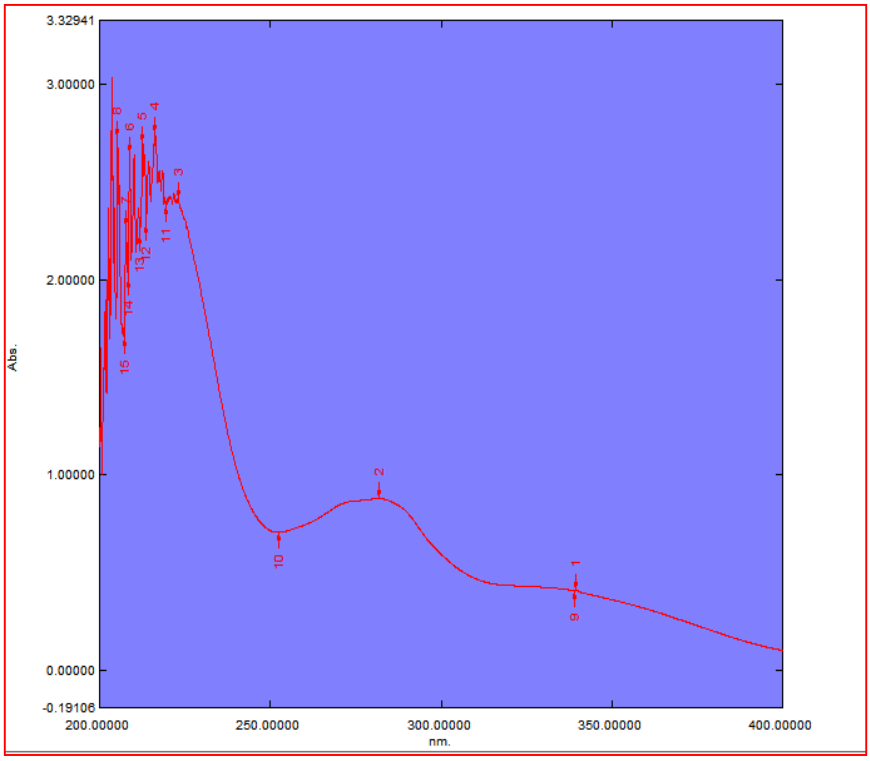


**Fig 2**

**Table 1**

| No. | P/V | Wavelength nm. | Abs. |
|---|---|---|---|
| 1 | ↑ | 339.60000 | 0.40755 |
| 2 | ↑ | 281.80000 | 0.87947 |
| 3 | ↑ | 223.00000 | 2.41418 |
| 4 | ↑ | 216.30000 | 2.75259 |
| 5 | ↑ | 212.60000 | 2.70441 |
| 6 | ↑ | 208.80000 | 2.64432 |
| 7 | ↑ | 207.80000 | 2.27277 |
| 8 | ↑ | 205.20000 | 2.73025 |
| 9 | ↓ | 339.20000 | 0.40715 |
| 10 | ↓ | 252.30000 | 0.70660 |
| 11 | ↓ | 219.60000 | 2.37773 |
| 12 | ↓ | 213.60000 | 2.28818 |
| 13 | ↓ | 211.80000 | 2.22971 |
| 14 | ↓ | 208.40000 | 2.00544 |
| 15 | ↓ | 207.20000 | 1.70763 |

Measurement Properties
Wavelength Range (nm.): 200.0 to 400.0
Scan Speed: Fast
Sampling Interval: 0.1

Instrument Properties
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0

### Morphotype II (*Hibiscus* Pink)

In UV spectrum the absorption data shows the weak band at 340 nm which indicates the aromatic nature of compound and presence of flavone.

The two broad absorption bands at 275 nm & 267 nm reveals the presence of carbonyl group (Ketone), anthocynin, thiophene and quercetin. The strong band at 223 nm again confirms ketones. Chalcone a type of flavonoid is also present in this band.

Spectrum shows absorption bands at the region 200-220 nm which indicates the presence of α-β unsaturated amides and lactam. The presence of bands at 213 nm & 207 nm again confirms the ketonic amide group and alkyne polyynes -2,4,6 – octatriyne. The intensity of absortion is proportional to the number of isolated chromophoric group in the molecule.UV spectroscopy reveals the presence of flavones, quercetin, anthocynin and chalcone types of flavonoids. (Fig No. 3, Table No. 2).

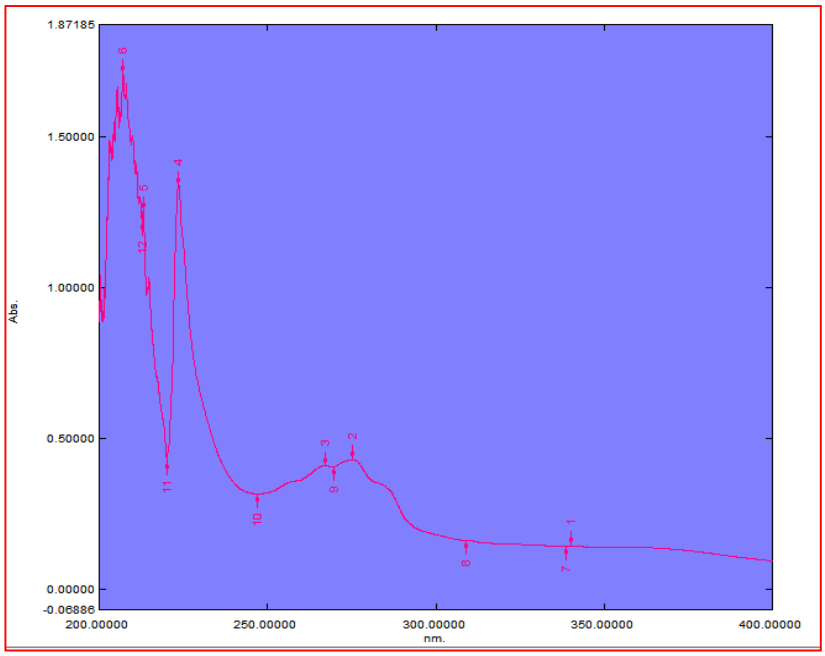


Fig 3

**Table 2**

Peak Pick

| No. | P/V | Wavelength nm. | Abs. |
|---|---|---|---|
| 1 | ↑ | 340.30000 | 0.14381 |
| 2 | ↑ | 275.10000 | 0.42955 |
| 3 | ↑ | 267.10000 | 0.40855 |
| 4 | ↑ | 223.50000 | 1.33605 |
| 5 | ↑ | 213.10000 | 1.25444 |
| 6 | ↑ | 207.10000 | 1.71012 |
| 7 | ↓ | 338.80000 | 0.14054 |
| 8 | ↓ | 309.10000 | 0.15949 |
| 9 | ↓ | 269.80000 | 0.40552 |
| 10 | ↓ | 247.10000 | 0.31561 |
| 11 | ↓ | 220.10000 | 0.42502 |
| 12 | ↓ | 212.70000 | 1.21620 |

Measurement Properties
Wavelength Range (nm.): 200.0 to 400.0
Scan Speed: Fast
Sampling Interval: 0.1

Instrument Properties
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0

**Morphotype III (*Hibiscus* Yellow)**

The UV spectrum shows the weak band at 340 nm which reveals the presence of aromatic nature of compound and flavones.

The two intense band at 280 nm and 271 nm which indicates the presence of carbonyl group (ketones), nitromethane, thiophene, aromatic nature of compound, kaempferol, anthocynin and quercetin type of flavonoids.

Appearance of absorption band at 224 nm is due to presence of carbonyl group (ketones), furan and chalcone. The presence of absorption band at 203 nm corresponding to carbonyl group (ketones), furan, amides and lactams.

UV spectroscopy reveals the presence of five types of flavonoids viz. flavone, kaempferol, anthocynin, quercetin and chalcone in yellow flower. (Fig No. 4, Table No. 3).

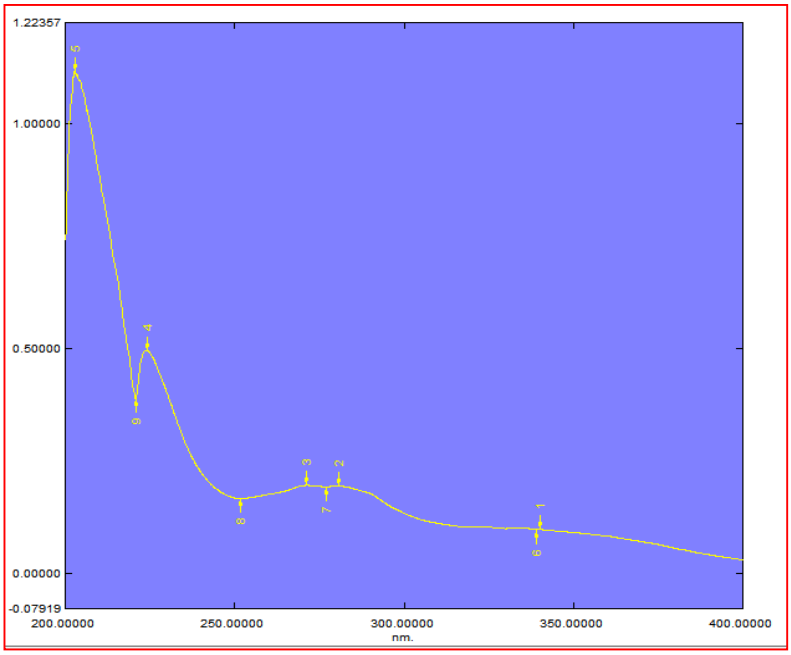


Fig 4

**Table 3**

| No. | P/V | Wavelength nm. | Abs. |
|---|---|---|---|
| 1 | ↑ | 340.30000 | 0.09752 |
| 2 | ↑ | 280.80000 | 0.19298 |
| 3 | ↑ | 271.30000 | 0.19487 |
| 4 | ↑ | 224.10000 | 0.49468 |
| 5 | ↑ | 202.80000 | 1.11501 |
| 6 | ↓ | 339.00000 | 0.09620 |
| 7 | ↓ | 277.00000 | 0.19175 |
| 8 | ↓ | 251.90000 | 0.16552 |
| 9 | ↓ | 220.90000 | 0.38688 |

Measurement Properties
Wavelength Range (nm.): 200.0 to 400.0
Scan Speed: Fast
Sampling Interval: 0.1

Instrument Properties
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0

**Morphotype IV (*Hibiscus* White)**

In UV spectrum, the absorption data shows the weak band at 340 nm which is corresponding to aromatic nature of compound and flavones.

The broad absorption band at 272 nm which shows the presence of carbonyl group (ketone), nitromethan, thiophene and flavonoids – Myricetin, quercetin and anthocynin.

Appearance of strong band at 224 nm reveals the presence of carbonyl group (ketone), furan and chalcone. The band at 205 nm which indicate the presence of α - β unsaturated amides and lactams and carboxylic acid.

From the UV spectroscopy it is concluded that five types of flavonoids are present viz. flavone, myricetin, anthocynin, quercetin and chalcone (Fig No. 5, Table No. 4).

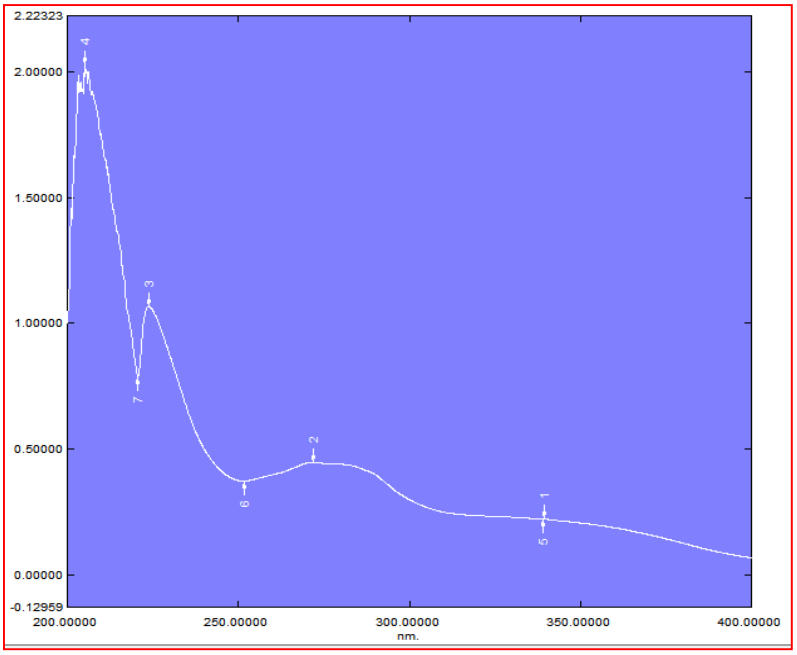


Fig 5

**Table 4**

| No. | P/V | Wavelength nm. | Abs. |
|---|---|---|---|
| 1 | ↑ | 339.60000 | 0.22160 |
| 2 | ↑ | 271.80000 | 0.44573 |
| 3 | ↑ | 223.90000 | 1.06668 |
| 4 | ↑ | 205.30000 | 2.02716 |
| 5 | ↓ | 338.90000 | 0.22024 |
| 6 | ↓ | 251.70000 | 0.37235 |
| 7 | ↓ | 220.50000 | 0.78617 |

Measurement Properties
Wavelength Range (nm.): 200.0 to 400.0
Scan Speed: Fast
Sampling Interval: 0.1

Instrument Properties
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0

## 4. Conclusion

The UV spectroscopy of ethanolic flower extract of four tested morphotypes of *Hibiscus rosa -sinensis* Linn. have shown the presence of Carbonyl (ketone), α-β unsaturated amide and lactam, flavones, chalcones and anthocynin types of flavonoids which are common in all morphotypes. But some variable chromophoric groups are also seen. The chromophoric groups and flavonoids are responsible for medicinal utility of the morphotypes. Generally it is found that carbonyl group and flavonoids intensifies medicinal biological activity (Chatwal, 1996; Mohammad *et. al.*, 2013). On the basis of chromophoric groups and flavonoids tested morphotypes are quite similar, so any one of them can be used as a substitute for other. Further research will be needed for the structure characterization of chromophoric group and flavonoids by use of different analytical method such as NMR and mass spectroscopy.

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**Table 5:** UV Spectroscopy of ethanolic flower extract of morphotypes of *Hibiscus rosa-sinensis* Linn.

| Morphotypes | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RF | | | | | PF | | | | YF | | | | WF | | | |
| **S. No.** | **Wave length nm** | **Abs.** | **Chromophoric group** | **Types of flavonoids** | **Wave length nm** | **Abs.** | **Chromophoric group** | **Types of flavonoids** | **Wave length nm** | **Abs.** | **Chromophoric group** | **Types of flavonoids** | **Wave length nm** | **Abs.** | **Chromophoric group** | **Types of flavonoids** |
| 1. | 339.60 | 0.40755 | Aromatic | Flavone | 340.30 | 0.1381 | Aromatic | Flavone | 340.30 | 0.09752 | Aromatic | Flavone | 339.60 | 0.22160 | Aromatic | Flavone |
| 2. | 281.80 | 0.87947 | Carbonyl group | Flavone Kaempferol Anthocynin | 275.10 | 0.42955 | Carbonyl Group and Ketones. | Anthocynin | 280.80 | 0.19298 | Aromatic, Nitromethans, Carbonyl Group and Ketones | Kaempferol Anthocynin | 271.80 | 0.44573 | Nitrogroup-Nitromethans, Thiophene, Carbonyl Group. | Quercetine Myricetin Anthocynin |
| 3. | 223.00 | 2.41418 | Ketones, 2-octyne | Chalcones | 267.10 | 0.40855 | Thiophene | Quercetine | 271.30 | 0.19487 | Nitrogroup-Nitromethans, Thiophene, Carbonyl Group. | Quercetine Anthocynin | 223.90 | 1.06668 | Furan, Ketones, Carbonyl group. | Chalcones |
| 4. | 216.30 | 2.75259 | Amides & Lactams, Methyl Vinyl Ketone. | | 223.50 | 1.33605 | Ketones, 2-octyne | Chalcones | 224.10 | 0.49468 | Furan, Ketones, Carbonyl group. | Chalcones | 205.30 | 2.02716 | α – β unsaturated Amides & Lactams. Carboylic acid. | |
| 5. | 212.60 | 2.70441 | Amide & Lactams. | | 213.10 | 1.25444 | Amide & Lactams | | 202.80 | 1.11501 | Furan, Carbonyl group, Amide & Lactams | | | | | |
| 6. | 208.80 | 2.64432 | Amido-Acetamide | | 207.10 | 1.71012 | Amide & Lactams, Alkyne-polyynes-2.4.6 -octatriyne | | | | | | | | | |
| 7. | 207.80 | 2.27277 | Amide & Lactams, Alkyne-polyynes-2.4.6 -octatriyne | | | | | | | | | | | | | |
| 8. | 205.20 | 2.73025 | α -β unsaturated amide & lactam, Carboxylic acid. | | | | | | | | | | | | | |