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Analysis of Subcellular Localization Sites and Calculation of Isotopic Mass for *Catharanthus roseus.*

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ABSTRACT

The aim of the study is to investigate the sub cellular localization sites for *Catharanthus roseus* and calculate the isotopic mass value for the elements present in the sample. The Plant sequence was retrieved and the localization sites were predicted by using PSORT tool. It shows Chloroplast Thylakoid Membrane has the highest value of 0.780. Isotopic mass was calculated for the elements present in the sample and it shows the carbon has the mass of 36536.549. From these results, it could be possible to understand the activity of the plant and we suggest that this plant may address the problem of cancer and act as an antitumor agent.

Keywords: Sub cellular Localization sites, Catharanthus roseus, Isotopic Mass value, Elements, Antitumour agent

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INTRODUCTION

In the last century, the compounds derived from the plants and utilized for ornamental purpose and in the preparation of medicines. Nowadays, *Catharanthus roseus* is a popular and familiar plant and it has sumptuous medicinal activity. It belongs to the family *Apocynaceae*. Self compatibility and a relatively high tolerance of disturbance have enabled this species to spread from cultivation and naturalise in many parts of the world. As a consequence, this species is sometimes considered to be an invasive weed, although it does not normally proliferate sufficiently to eliminate native vegetation. [1]

The researchers found that the *Catharanthus roseus* have anti-diabetic properties due to the presence of several highly toxic alkaloids present in it. These alkaloids are used in the treatment of different types of cancer with one derived compound vincristine. The alkaloid Alstonine which has been used to reduce blood pressure. The anti cancer drug namely Vincristine and Vinblastine are produced from *Catharanthus roseus* and it has number of Pharmaceutical Activities. [2]

Anti cancer drug Vinblastine and vincristine are alkaloids found in *Catharanthus Roseus*. They are administered intravenously and these solutions are fatal if they are administered any other way and can cause a lot of tissue irritation if they leak out of the vein. Although these compounds are very similar in structure and have the same basic action and they have distinctly different effects on the body. [3]

Plant and phytochemical products continue to play an important role in medicine. The toxicological potentials of the aqueous leaf extract of *Catharanthus roseus* was used to treat cancer. [4] *Catharanthus roseous* produces phenols, chemicals to protect itself but resent research demonstrate that may phytochemicals can protect humans against diseases. [5]

In *Catharanthus roseus* is known to produce a distinct spectrum of terpenoid indole alkaloids. Since the invaluable anti neoplastic bis indole alkaloids are restricted to the aerial parts of the plant and do not occur in its underground tissues, identification of the structural and regulatory factors operating distinctly in the shoot and leaf of the plant. [6]*Catharanthus roseus* is very important and different parts of the plant used in the treatments of various diseases in many numbers of countries. Moreover, more than 130 alkaloids have been isolated from different parts in which two important alkaloids Vinblastine and Vincristine are used in cancer treatment present in very low concentrations. Thus, in present communication various in vitro biotechnological and biochemical approaches have been used all over the world. [7]

The preliminary cytotoxicity study demonstrated does independent cytotoxic activity of methanol extract of. *Catharanthus roseus* when screened (HCT116) colorectal carcinoma cell line. N-hexane, chloroform and methanol fractions showed does independent cytotoxic activity with chloroform fractions showing the highest activity. [8]



The antibacterial and antidiabetic activities of whole plant extract of *Catharanthus roseus* has been evaluated by the researchers. [9] The Exhibition of antioxidant and anti mutation that suggested the chemo preventive potential against various cancers including breast cancer. This research was conducted to investigate anticancer activity of *Catharanthus roseus*. [10]

METHODOLOGY

The *Catharanthus Roseus* sequence was collected from the database and submitted to PSORT tool for the analysis of Sub Cellular Localization Sites. The Localization sites were predicted and the values were retrieved for the regions. The sequence was also subjected to Isotopident tool for the calculation of isotopic mass. The mass values were calculated for the elements such as Carbon, Hydrogen, Oxygen, Nitrogen and Sulphur. Finally, the values were compared and discussed.

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Catharanthus Roseus		
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RESULTS AND DISCUSSION

Fig 1: Submission of the plant sequence to the PSORT tool

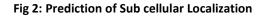
Table 1: Analysis of Sub Cellular Localization

S.No.	Sub Cellular Localization	Composition
1	Chloroplasts Thylakoid Membrane	0.780
2	Mitochondrial Inner Membrane	0.749
3	Chloroplasts Stroma	0.666
4	Chloroplasts Thylakoid Space	0.666

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Query Information	
ORIGIN plant BEGIN >CATHABANTHUS ROSEUS MVFHSSFDSS SSSTSLLIFL ISSLLISTHF NVHIEAQTTP PIVSGLSFTF TYDSSCPLES IIRNURLENY FANIGQAAGL LRHHHDCTV QOCDOSVLLV GSASGPGEQD APPHILSLOG AFRIINDLER RVHSSCORTV SCSDILALAA RUSVVLSGGF EVVPLGREG CUFAFCHET LINHLPPSSN TSELIJSLAT RUFNATUVA LSGOHTIGVG RCVSFEERLY PTQDFTMDQT FARMLELTCP ALNTTHTVL JESGNFFDE NYVVLENNGQ GLTSFDQLT TERRETGIVT	
DRAWINTYU FIRVINALUM ATVINUU AUTONO GEIRANCSUR HAASORSSSL USUVUEDAAEV GLSHF	
Result Information	
PSORT Prediction of Protein Localization Sites version 6.4(WWW)	
CATHARANTHUS 365 Residues Species classification: 5	
*** Reasoning Step: 1	
Preliminary Calculation of ALOM (threshold: 0.5) count: 1	
Position of the most N-terminal THS: 16 at 1=1 <u>MTOP: membrane topology (Hartmann et al.)</u> I (middle): 23 Charge diffirence(C-N): -1.0	
McG: Examining signal sequence (McGeoch) Length of UR: 27	
Peak Value of UR: 1.40 Net Charge of CR:0	
Net Charge DI CK: 0 Discriminant Score: -0.18	
GVH: Examining signal sequence (von Heijne)	×
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Fig 5: Calculation of Isotopic mass for the sequence

Table 2: Composition of Isotopic mass for the elements

Element	Mass
C ₃₀₄₂	36536.549
H ₄₈₀₃	4841.136
N ₈₂₅	11555.528
O ₉₀₆	14495.456
S ₂₆	833.690
Average mass	68262.359

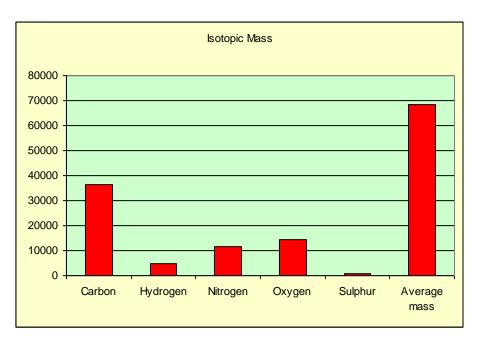
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Graph 1: Composition of Isotopic masses

DISCUSSION

The Catharanthus Roseus sequence was collected from the database and submitted to PSORT tool for the analysis of Sub Cellular Localization Sites. (Fig 1) The sub cellular localization regions were predicted and displayed in Fig 2. In Fig 3, the composition of regions in the sites was derived from the tool. The Regions were Chloroplasts Thylakoid Membrane, Mitochondrial inner Membrane, Chloroplasts Stroma and Chloroplasts Thylakoid space. The Composition values for these regions showed as 0.780 and 0.749 for Chloroplasts Thylakoid Membrane and Mitochondrial inner Membrane respectively. The values 0.666 and 0.666 for Chloroplasts Stroma and Chloroplasts Thylakoid space. The Sequence was also submitted to Isotopident tool for the Calculation of mass value. (Fig 4) The atom Carbon, Hydrogen, Oxygen, Nitrogen and Sulphur plays a major role in the functioning of biomolecules. Fig 5 shows that the isotopic calculation of mass for these atoms. It shows the value for Carbon is 36536.549 and 4841.136 for Hydrogen. The values 11555.528, 14495.456 and 833.690 for Oxygen, Nitrogen and Sulphur respectively. The element Carbon has the highest mass value while Sulphur is very less. The element Oxygen and Nitrogen has a moderate value while hydrogen is less when compared with these elements. The average mass value for the above elements is that 68262.359 is showed in Table 2. Graph 1 show that the comparison of mass value and graphical representation of elements based on the values.

CONCLUSION

The *Catharanthus Roseus* sequence was retrieved from database and the sub cellular localization sites were identified. The Plant sequence which shows Chloroplast thylakoid membrane has the highest value of 0.780. It plays a significant role in all the biological



functions. The sequence was also subjected to isotopic mass calculation and the mass value for the elements was calculated. From these observations, we found that the atom carbon has the highest mass value which is present in the *Catharanthus Roseus* sample.

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