Original Article

Physicochemical standardisation of the homoeopathic drug *Rumex acetosella* and its comparison with another homoeopathic drug, *Rumex crispus*

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Abstract

Background: *Rumex acetosella*, a relatively new drug in the homoeopathic system, is traditionally used for treating inflammation, diabetes and gastrointestinal problems, especially diarrhoea. **Objective:** The aim of this work is to report physicochemical standardisation of the homoeopathic drug, *Rumex acetosella*. Further, we propose our simple and economical method to differentiate it with a closely related species, *Rumex crispus*. **Materials and Methods:** The physicochemical study measuring several parameters was done. The pH of the mother tincture (MT) and the water extract was measured and compared. Furthermore, the chemical composition of the *Rumex acetosella* MT were compared with taxonomically closely related *Rumex crispus* MT by thin layer chromatography (TLC). **Results:** The results show a strong relationship between the extracting solvent's polarity and its extracting power. A simple TLC study shows a strong correlation between two drugs of the same genus, *Rumex*, but they can be differentiated by their unique spots. **Conclusion:** Our study not only provides the physicochemical standards for the drug *Rumex acetosella* but also shows that a simple analytical technique, a manual TLC can easily be used to distinguish two taxonomically close homoeopathic drugs.

Keywords: Drug standardisation, Homoeopathy, Physicochemical, *Rumex acetosella*

Introduction

The homoeopathic system of medicine is one of the most widely used medical systems.[1] Most of the homoeopathic drugs are of natural origin.[2-4] This makes quality assurance (QA) and quality control (QC) and standardisation of homoeopathic medicines, extremely challenging.[5,6] However, it is mandatory to maintain the high quality and authenticity of the administered homoeopathic drugs because of its safety and efficacy.[7-10] Considering the present situation and challenges, the World Health Organization and other premier authorities laid down the guidelines for herbal medicines' safety and effectiveness.[11-14] The advent of new physicochemical–analytical techniques, e.g. high-performance thin layer chromatography (TLC), high-performance liquid chromatography, nuclear magnetic resonance spectroscopy, liquid chromatography–mass spectrometry, gas chromatography–mass spectrometry, ultraviolet–visible (UV-Vis) spectroscopy and Fourier-transform infrared spectroscopy, can ensure in-depth chemical profiling of herbal, including homoeopathic medicines.[15-19] However, the employment of these analytical techniques requires a substantial financial budget. Hence, we report a simple, highly specific, fast, yet economical physicochemical standardisation of *Rumex acetosella*. We hope our work may be utilised for pharmacopoeial standards in the future.

The genus *Rumex* is known to have numerous medicinal uses.[20-23] Homoeopathic system rightly recognises the therapeutic value of this genus. At least three species of

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this genus are used as homoeopathic medicines, e.g. *Rumex acetosa, Rumex crispus* and *Rumex acetosella*.[24-27] The first two have been widely studied by the homoeopathic community. The drug under study is a relatively less studied one in this medical system.[24-29] To the best of our knowledge, there is no earlier report of physicochemical standardisation for the homoeopathic formulation of the drug *Rumex acetosella*. There is no previous report on the preparation of the drug's formulation as per Homoeopathic Pharmacopoeia of India. Thus, as expected, there is no commercially available mother tincture (MT). However, there are non-homoeopathic extracts available.[30-32] *Rumex acetosella* is traditionally used for treating inflammation, diabetes and gastrointestinal problems, especially diarrhoea.[33-35] Further studies show its anticancer and antioxidant properties.[36-38] To verify the high specificity of this simple and economical study, we compare the drug, *Rumex acetosella*, with another homoeopathic drug, *Rumex crispus*, having the same genus (taxonomically, two species with the same genus are closest).

Materials and Methods

Collection of the raw drug

The botanical names of the drugs *Rumex crispus* and *Rumex acetosella* are same as that of their respective homoeopathic names. The raw drug *Rumex acetosella* was collected from wild in the flowering stage from Thummanatty Junction, Udhagamandalam, on 15 September 2017 (Voucher number: 9107). The other raw drug *Rumex crispus* was collected from Thettukal, Udhagamandalam, on 16 December 2014 (Voucher number: 8886). The plants were taxonomically authenticated by the Field Botanist at the Centre of Medicinal Plants Research in Homoeopathy, Emerald, Udhagamandalam. The sun-dried plants were collected for the drug preparation. Then, they were shade-dried for 24 h. This sun- and the shade-dried plants have been used as the raw drug for our study.

Part used

Whole plant, except the root of *Rumex acetosella*, was used for physicochemical study of the raw drug, preparation and standardisation of the homoeopathic drug of the same name. The rhizomes of the plant *Rumex crispus* were used for the preparation and physicochemical study.

There is no known literature available for the preparation of the homoeopathic MT of *Rumex acetosella.* Hence, we adopted maximum extractive value (MEV) method to find out the alcohol percentage for the preparation of the MT. The water was distilled twice before using for MT preparation and other studies. For TLC, aluminium plates pre-coated with silica gel and fluorescent indicator 60F-254™ of 0.25 mm thickness manufactured by Merck Chemicals were used. For the detection of spots, UV lamps with 254 nm, 365 nm and visible light were used. In addition, vanillin-sulphuric acid stain was used and observed under visible light.

Experimental procedures

Procedure for physicochemical study of the raw drug

1. Loss on drying (LOD): Around 2 g of accurately weighed air-dried raw drug was kept in a well-ventilated oven for 3 h at 105°C. After removing the drug from the oven, it was allowed to cool to room temperature by keeping the dried raw drug in a desiccator for 20 min. Then, it was again weighed. The LOD (moisture content) in percentage was calculated as follows:

Weight of empty Petri dish = W_{empty}

Weight of the Petri dish with air-dried raw drug = W_{+wet}

Weight of the air-dried raw drug = $W_{+wet} - W_{empty} = w_{wet}$

Weight of the oven-dried (105°C) raw drug = $W_{+dry} - W_{empty} = w_{dry}$

$$\%LOD = \frac{(w_{wet} - w_{drug})}{w_{wet}} \times 100 .$$

2. Preparation of MT

As there is no known literature regarding the preparation, we adopted the MEV method to ascertain the alcohol percentage for the MT preparation.

3. Extractive values
   a. Around 2.0 g of the accurately weighed raw drug was taken (moisture content was taken into account). To it, 50 mL of EtOH was added and kept for 24 h at room temperature. After filtering it, 10 mL was taken and evaporated on a water bath to remove most alcohol. It was then heated at 105°C in a well-ventilated oven until a constant weight was achieved by removing the rest of the solvent. The above experiment was performed twice, and the average value was reported. The ethanol extract value was calculated as follows.

Drug weight = w_{drug} (moisture content was subtracted to calculate the drug weight)

Empty Beaker weight = w_{empty}

Beaker +dried Extract weight = w_{+drug}

$$\text{EtOH extract} = \frac{(w_{+drug} - w_{empty})}{\frac{w_{empty}}{5}} \times 100 = \quad \%w/w.$$

   b. In a closely related experiments, extract values in petroleum ether, chloroform, ethyl acetate and methanol were determined using 50 mL of the chosen solvent instead of ethanol.

4. Ash values:
   a. Determination of total ash value

Around 2.0 g of the accurately weighed raw drug was taken (moisture content was taken into account) in a thermally resistant previously weighed crucible. The crucible, along with its content, was heated to 450°C for 30 min under aerial conditions. The crucible was cooled in a desiccator for 15 min

and weighed. This procedure was repeated until a constant weight was obtained.

Then, the percentage of total ash was calculated as follows.

Empty crucible weight = w_{empty}

Drug weight== w_{drug}

Crucible + ash weight = w_{+ash}

Total ash = $w_{+ash} - W_{empty} = w_{ash}$

$$\% \text{ Total ash} = \frac{w_{ash}}{w_{drug}} \times 100 \ \%w/w$$

The above experiment was performed twice, and the average value was reported.

b. Determination of acid-insoluble ash value

The ash remained from the previous experiment (4 a) was boiled with 25 mL of 10% HCl for 5 min. The insoluble matter was collected over an ash-less filter paper, washed with hot water and ignited for 15 min at a temperature of about 450°C under aerial condition. The crucible was cooled in a desiccator for 15 min and weighed. The heating was repeated until a constant weight is reached. The above experiment was performed twice, and the average value was reported.

Empty Crucible weight = w_{empty}

Drug weight== w_{drug}

Crucible + acid-insoluble ash weight = $w_{+ \text{acid (i) ash}}$

Acid-insoluble ash = $w_{+\text{acid (i) ash}} - w_{empty}$

$$\% \text{ acid-insoluble ash} = \left[\frac{\{w_{+\text{acid(i) ash}} - w_{empty}\}}{w_{drug}}\right] \times 100 \quad = \%w/w$$

c. Determination of water-soluble ash value

The ash remained from the previous experiment (4 a) was boiled with 25 mL of water for 5 min. The insoluble matter

Kingdom: Planta
Subdivision: Spermatophyte
Subkingdom: Viridiplantae
Infrakingdom: Streptophyta
Superdivision: Embryophyta
Division: Tracheophyta
Class: Magnoliopsida:
Superorder: Caryophyllanae
Order: Caryophyllales
Family: Polygonaceae
Genus: Rumex L.
Species: Rumex acetosella L.

Figure 1: Taxonomic classification of *Rumex acetosella* L

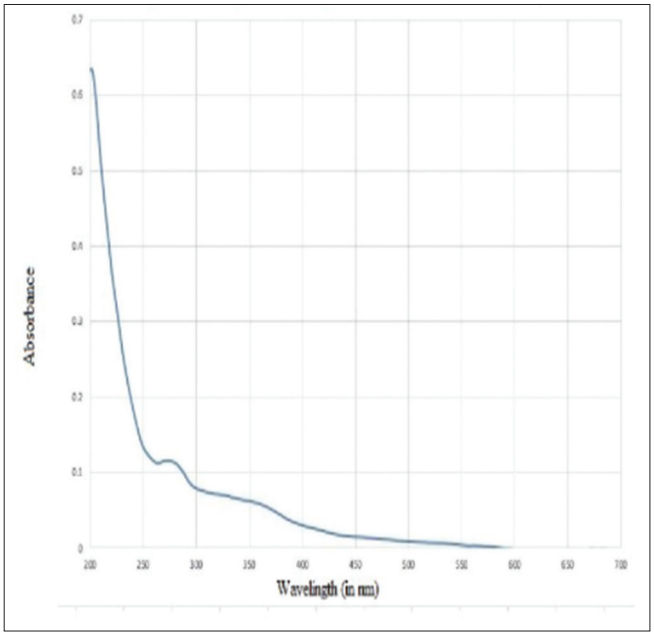

Figure 3: Ultraviolet-visible spectra of *Rumex acetosella* mother tincture

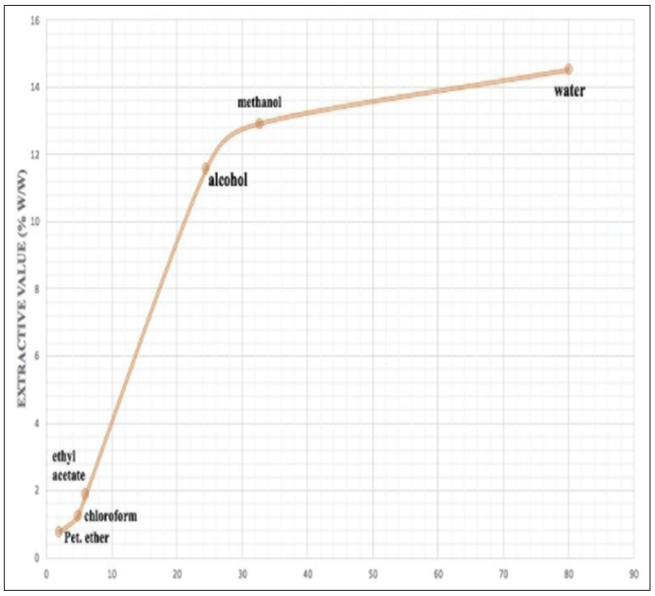

Figure 2: Extractive value (%w/w) versus dielectric constant (ε)

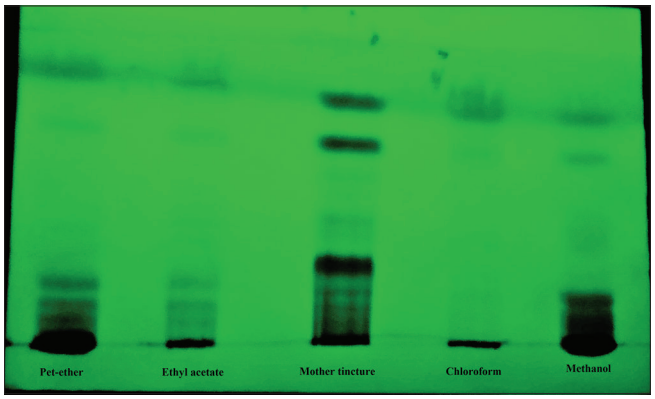

Figure 4: Thin layer chromatography of Pet-ether extract, ethyl acetate extract, chloroform extract of mother tincture, chloroform extract and methanol extract of the drug *Rumex acetosella* under 254 nm ultraviolet light. Pet-ether: Petroleum

was collected on an ash-less filter paper and washed with hot water. The ash-less filter paper and the residue were ignited for 15 min at a temperature of about 450°C under aerial conditions. The crucible was cooled in a desiccator for 15 min and weighed, repeated for a constant value. The weight of insoluble matter was subtracted from the weight of total ash. The difference in weight represents the water-soluble ash. The percentage of water-soluble ash was calculated as follows. The above experiment was performed twice, and an average value was reported.

Empty crucible weight = w_{empty}

Drug weight== w_{drug}

Crucible + water-insoluble ash weight = $w_{+water\ (i)\ ash}$

Water insoluble ash = $w_{+water\ (i)\ ash} - w_{empty}$

Total ash= w_{+ash}

Water-soluble ash = Total ash − water-insoluble ash = $w_{ash} - w_{water(i)\ ash} = w_{water\ (s)}$

$$\% \text{ Water soluble ash} = \left[\frac{w_{water\ (s)}}{w_{drug}}\right] \times 100 = \%w/w$$

Procedure for physicochemical study of the homoeopathic formulation (i.e. mother tincture)

1. Determination of total solids

A 10 mL of MT of the drug was heated on a water bath to remove the alcohol. After that, the water content was removed by heating it inside a well-ventilated oven. The sample was cooled in a desiccator for 15 min and weighed. The heating process was repeated until a constant value is reached. The above experiment was performed twice, and the average value was reported.

Empty beaker weight = w_{empty}

Beaker + dried extract weight = $w_{+dried\ drug}$

Total solids = $w_{+dried\ drug} - w_{empty}$

$$\%\text{Total solids} = \left[\frac{(w_{+dried\ drug} - w_{empty})}{drugvolume}\right] \times 100 = \%\ w/v$$

Specifically, in this case:

$$\%\text{Total solids} = \left[\frac{(w_{+dried\ drug} - w_{empty})}{drugvolume}\right] \times 100 = \%w/v$$

2. Weight per mL = 10 mL of the MT was weighed, and the weight was divided by 10 to get the data
3. The pH was determined by a digital pH-meter. The sample's pH was recorded only after calibration using buffer solutions (pH = 4 and pH = 9.2) each time
4. λ_{max}: The measurement was made by diluting the MT by ~ 100 times. The diluting solvent is the same as the MT solvent system
5. TLC: Around 20 mL of the MT was heated on a water bath to remove the alcohol. The leftover, thus obtained, was extracted by three 20 mL portions of chloroform. The chloroform extract was then concentrated to ~2 mL by heating on a water bath. This concentrated extract was used to carry out TLC on pre-coated silica gel aluminium plate $60F_{-254}$ of 0.25 mm thickness manufactured by Merck, using a 9:1 $CHCl_3$:CH_3OH solvent system

For other solvents, i.e. petroleum ether, ethyl acetate, chloroform, ethanol and methanol, 1.00 g of the plant material was extracted with the chosen solvent. Then, the extract obtained after filtration was concentrated to 2 mL. That concentrated extract was used directly for TLC study.

Results and Discussion

Biological description

Rumex acetosella is a perennial herb with a lean and reddish erect stem. The branching happens at the top. The plant is

Table 1: Raw drug parameters

Parameter	Value (% w/w)
Foreign matter-	0.2
Moisture content (LOD at 105°C)	8.60
Total ash	12.45
Acid-insoluble ash	4.81
Water-soluble ash	2.44
Extractive values	
Distilled water (ε=80.1)	14.52
Methanol (ε=32.7)	12.92
Ethyl alcohol (ε=24.5)	11.57
Ethyl acetate (ε=6.02)	1.88
Chloroform (ε=4.81)	1.22
Petroleum ether (ε=1.9)*	0.76

*The dielectric constant is approximated as for hexane. LOD: Loss on drying

Table 2: Finished product physicochemical data

Preparation	Physicochemical data
Mother tincture (ϕ)	
Drug strength	1/10
Rumex acetosella in coarse powder (g)	100
Purified water (mL)	300
Strong ethanol (mL), ~95% v/v aqueous ethanol	736
To make one thousand millilitres of the mother tincture	
Test for mother tincture (ϕ)	
Organoleptic profile	
Appearance	Clear, non-viscous
Colour	Yellowish brown
Odour	Fruity and slightly pungent
Sediments	Absent
Weight (mL)	0.94 g (at 25°C)
Total solids	3.56% w/v
Alcohol content	70% v/v
pH	5.75 (ϕ), 4.85 (water extract)
λ_{max}	273 nm and 365 nm*

*Absorption, λ_{max} <220 nm has been neglected as they are not usually characteristic absorbance

around 50 cm in height. The leaves are arrow-shaped. The taxonomic classification of *Rumex acetosella* is as shown in Figure 1.[39]

Physicochemical study

The raw drug's experimental physicochemical parameters are tabulated in Table 1.

The total ash was around 12%–13%. This value indicates the metal, silica and silicates content of the sample. As the root has also been included in the standardisation study, soil particles' contribution to the total ash value cannot be ruled out. This assumption may further be justified by the fact that the sample has considerable acid-insoluble ash value. The extractive values in different solvents show a strong correlation between the solvent's polarity and the extractive values. With the increase in the solvent's polarity, there is an increase in extractive values [Figure 2]. The overall result has been summarised in the following graph. The moisture content was found to be around 8%–9%. This moderately low value is expected as the plant sample used has already been sun- and shade-dried.

The values of the physicochemical parameters for the finished product/MT are summarised in Table 2.

The specific gravity of the prepared MT was 0.94. Considering the solvent's density (~0.90), it is quite effective to extract chemicals from the plant [Table 2]. This observation was re-verified from high total solid, 3.54% w/v of the MT [Table 2]. These values suggest that the solvent system used is quite effective in extracting the plant's chemical components. The pH of the MT was found to be 5.75 [Table 2]. Hence, H+ concentration in the MT is $\sim 10^{-5.75}$. The pH value indicates that the MT is substantially acidic (pH <7 are considered acidic). The MT's acidic nature is expected as Vitamin C is one of the plant's key components. We further investigated the pH issue by measuring the value of the aqueous extract [Table 2]. The pH of the aqueous extract is much lower than that of MT. Our experimental values show that H+ concentration in the aqueous extract is almost eight times that of the MT. We think that the origin of this observation is the less polarity of the solvent system used for the MT compared to water.

From the UV-VIS spectra, the absorbance was found to be in the region of near UV range [Figure 3]. We have also carried out the UV-VIS absorbance of *Rumex acetosella* in different extractive liquids [Table 3]. As expected, with a change in the extractive liquid's polarity, the pattern of UV spectra (λ_{max} values) change.

To carry out the initial chemical profiling of the drug, *Rumex acetosella*, we have performed TLC study on the chloroform extract of the MT as well as raw drug extracts in different solvents, e.g. petroleum ether, ethyl acetate, chloroform and methanol using silica gel as the mobile phase and 9:1 $CHCl_3$:CH_3OH as the eluent. The TLC plates of the drug under different lights and stain are shown in Figures 4-7, and the Rf values are given in Table 4.

Figures 4-7 and Table 4 show that the number of spots for chloroform extract of the MT is the highest. The number of TLC spots indicates that the solvent system used for the MT preparation is exceptionally effective in extracting the chemicals from the plant materials. This TLC study provides preliminary chemical profiling of the plant. The TLCs with other extractive liquids provide the data that can be used in Homoeopathy and other systems of medicines.

Table 3: Ultraviolet-visible absorbance of *Rumex acetosella* in different extractive solvents

Extractive liquid	λ_{max} (nm)
Water	278, 332 and 384
Methanol	267, 331 and 381
Petroleum ether	262, 286 and 410

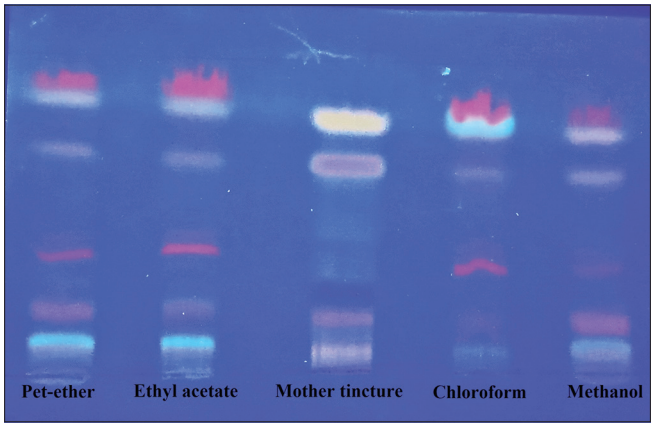

Figure 5: Thin layer chromatography of Pet-ether extract, ethyl acetate extract, chloroform extract of mother tincture, chloroform extract and methanol extract of the drug *Rumex acetosella* under 365 nm ultraviolet light. Pet-ether: Petroleum

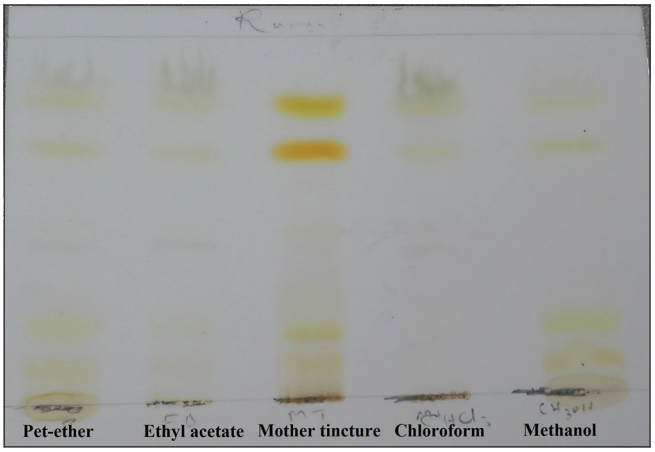

Figure 6: Thin layer chromatography of Pet-ether extract, ethyl acetate extract, chloroform extract of mother tincture, chloroform extract and methanol extract of the drug *Rumex acetosella* under white light. Pet-ether: Petroleum

Table 4: R_f values of the spots of mother tinctures and extracts in different solvents of *Rumex acetosella*

Detector	Pet ether extract	Ethyl acetate extract	Mother tincture	Chloroform extract	Methanol extract
254 nm	0.09 (brownish black)	0.09 (brownish black)	0.09 (brownish black)	0.09 (brownish black)	0.09 (brownish black)
	0.15 (brownish black)	0.15 (brownish black)	0.16 (brownish black)	0.16 (brownish black)	0.16 (brownish black)
	0.22 (brownish black)	0.20 (brownish black)	0.26 (brownish black)	0.33 (brownish black)	0.37 (brownish black)
	0.33 (brownish black)	0.33 (brownish black)	0.44 (brownish black)	0.62 (brownish black)	0.61 (brownish black)
	0.48 (brownish black)	0.46 (brownish black)	0.55 (brownish black)	0.77 (brownish black)	0.74 (brownish black)
	0.74 (brownish black)	0.72 (brownish black)	0.64 (brownish black)		
	0.87 (brownish black)	0.87 (brownish black)	0.77 (brownish black)		
365 nm	0.08 (blue)	0.10 (blue)	0.08 (blue)	0.08 (blue)	0.08 (blue)
	0.19 (red)	0.19 (red)	0.11 (yellow)	0.16 (red)	0.16 (red)
	0.32 (blue)	0.36 (blue)	0.16 (red)	0.24 (pink)	0.24 (-do-)
	0.37 (pink)	0.40 (pink)	0.24 (black)	0.36 (blue)	0.36 (blue)
	0.65 (blue)	0.62 (blue)	0.32 (blue)	0.59 (-do-)	0.59 (yellow)
	0.78 (yellow)	0.77 (yellow)	0.40 (-do-)	0.72 (-do-)	0.68 (-do-)
	0.85 (pink)	0.85 (pink)	0.60 (brown)	0.78 (pink)	0.77 (pink)
			0.73 (yellow)		
Vanillin-sulphuric acid reagent spray	0.08 (red)	0.07 (red)	0.07 (red)	0.12 (light voilet)	0.08 (red)
	0.13 (blue)	0.14 (blue)	0.12 (blue)	0.30 (-do-)	0.14 (blue)
	0.20 (yellow)	0.19 (light yellow)	0.16 (yellow)	0.47 (-do-)	0.20 (yellow)
	0.29 (light violet)	0.29 (light violet)	0.26 (yellow)	0.69 (-do-)	0.29 (-do-)
	0.41 (-do-)	0.41 (-do-)	0.30 (red)	0.80 (-do-)	0.52 (light violet)
	0.57 (-do-)	0.57 (-do-)	0.44 (-do-)		0.67 (-do-)
	0.72 (-do-)	0.69 (-do-)	0.47 (blue)		0.77 (-do-)
	0.86 (-do-)	0.83 (-do-)	0.52 (yellow)		
			0.57 (-do-)		
			0.69 (blue)		
			0.80 (yellow)		
Visible light	0.11 (yellow)	0.11 (yellow)	0.10 (yellow)	0.68 (yellow)	0.10 (yellow)
	0.21 (yellow)	0.21 (yellow)	0.19 (yellow)	0.79 (yellow)	0.19 (yellow)
	0.71 (yellow)	0.71 (yellow)	0.68 (yellow)	0.87 (yellow)	0.71 (yellow)
	0.85 (yellow)	0.84 (yellow)	0.79 (yellow)		0.89 (yellow)
	0.89 (light green)	0.88 (light green)			

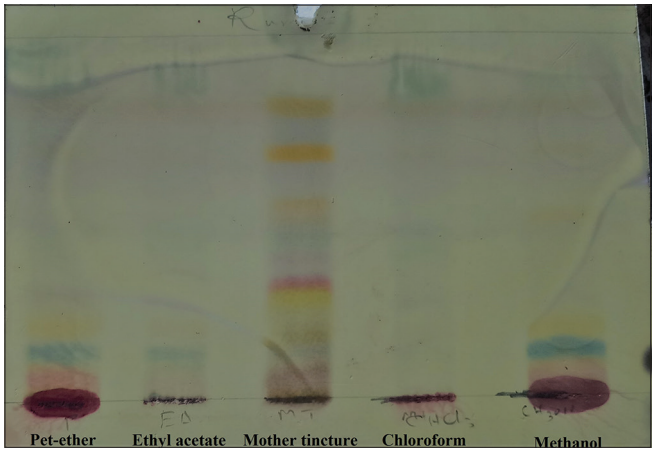

Figure 7: Thin layer chromatography of Pet-ether extract, ethyl acetate extract, chloroform extract of mother tincture, chloroform extract and methanol extract of the drug *Rumex acetosella* under white light with vanillin-sulphuric acid stain. Pet-ether: Petroleum

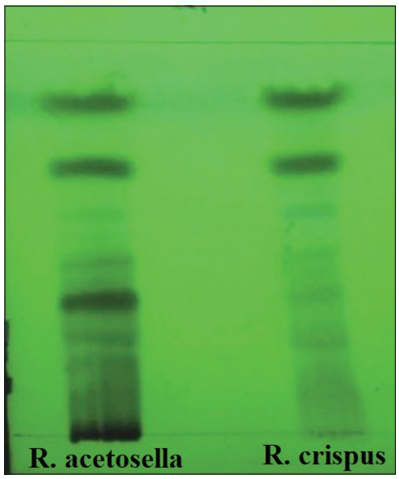

Figure 8: Comparative thin layer chromatography of chloroform extracts of mother tinctures of *Rumex acetosella* (left) and *Rumex crispus* (right) under 254 nm ultraviolet light

Comparative study of plants of different species of the same genus

We compared the homoeopathic formulations (MT) of the drugs *Rumex acetosella* and *Rumex crispus*. We sought to compare the homoeopathic formulations instead of raw drugs as QA and QC of the formulations are more important compared to that of raw drugs for safe and effective administration of the medicines. For a comparative study, we

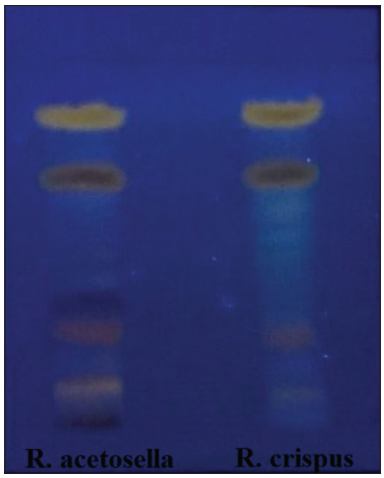

Figure 9: Comparative thin layer chromatography of chloroform extracts of mother tinctures of *Rumex acetosella* (left) and *Rumex crispus* (right) under 365 nm ultraviolet light

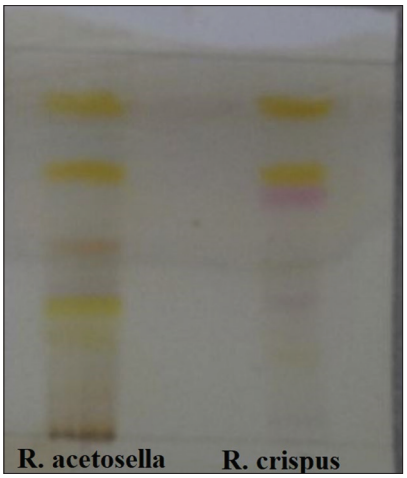

Figure 10: Comparative thin layer chromatography of chloroform extracts of mother tinctures of *Rumex acetosella* (left) and *Rumex crispus* (right) under white light with vanillin-sulphuric acid stain

Table 5: Comparative thin layer chromatography of chloroform extracts of mother tinctures of *Rumex acetosella* (left) and *Rumex crispus* (right)

Detector	*Rumex acetosella*	*Rumex crispus*
254 nm	0.26 (brownish black)*	0.64 (brownish black)
	0.64 (brownish black)	0.77 (brownish black)
	0.77 (brownish black)	
365 nm	00.08 (blue)	0.08 (blue)
	0.11 (yellow)	0.11 (yellow)
	0.16 (red)	0.16 (red)
	0.24 (black)	0.24 (black)
	0.32 (dark blue)*	0.40 (-do-)
	0.40 (-do-)	0.50 (light blue)*
	0.60 (brown)	0.60 (brown)
	0.73 (yellow)	0.73 (yellow)
Vanillin-sulphuric acid reagent spray	0.07 (red)	0.07 (red)
	0.12 (blue)	0.12 (blue)
	0.16 (yellow)	0.16 (yellow)
	0.26 (yellow)	0.26 (yellow)
	0.30 (red)*	0.57 (-do-)
	0.44 (-do-)*	0.69 (blue)
	0.47 (blue)*	0.80 (yellow)
	0.52 (yellow)	0.52 (yellow)
	0.57 (-do-)	0.57 (purple)*
	0.69 (blue)	00.80 (yellow)
	0.80 (yellow)	

*Unique spots

focused chiefly on the TLC study. This is because the TLC study would separate different chemicals in the extract based on their on the chemical nature. These different chemicals can be seen as different spots having different colours under UV-VIS light and with TLC stains. As expected, our TLC study shows [Figures 8-10 and Table 5] that these two taxonomically closely related plants are also chemically similar (they have many spots of the same R_f values when simultaneously eluted from different spots on the same TLC plate). However, there are unique spots for each of the drugs. These unique spots may be utilised to differentiate the respective mother tinctures.

Remarkably, subtle chemical differences between two homoeopathic formulations prepared from herbs of the same genus could be differentiated by simple, cost-effective TLC analysis.

Conclusion

This work provides the physicochemical parameters of the homoeopathic formulation of the drug *Rumex acetosella*. Our study proposes physicochemical standards for this drug. Besides, we demonstrated that TLC could be employed as a cheap and straightforward analytical technique to differentiate between two closely related dugs. We believe our study provides a simple, economical, yet significantly sensitive physicochemical standardisation procedure for the drug *Rumex acetosella*.

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Conflicts of interest

None declared.

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होम्योपैथिक दवा रूमेक्स एसेटोसेला का भौतिकरासायनिक मानकीकरण तथा रूमेक्स क्रिस्पस नामक अन्य होम्योपैथिक दवा से उसकी तुलना।

पृष्ठभूमिः रूमेक्स एसेटोसेला, होम्योपैथिक प्रणाली में अपेक्षाकृत एक नयी दवा, जो परंपरागत तौर पर सूजन,मधुमेह,तथा जठरांत्र संबंधी बीमारियों, खासतौर पर दस्त का उपचार करने में इस्तेमाल होती थी। **उद्देश्यः इ**स कार्य का उद्देश्य होम्योपैथिक दवा रूमेक्स एसेटोसेला का सबसे पहले भौतिकरासायनिक मानकीकरण प्रतिवेदित करना था। इसके अतिरिक्त, हम रूमेक्स क्रिस्पस नामक निकटतम संबंधित प्रजाति से इसे भिन्न दिखाने के लिए अपनी सरल एवं सस्ती पद्धति को पैमाना बनाते हैं। **सामग्रियाँ एवं पद्धतियाँः** विभिन्न प्रकार के पैमानों को मापने वाला भौतिकरासायनिक अध्ययन हो चुका है। मूल अपमिश्रण का पीएच तथा जल सत्त का मापन एवं मिलान किया गया था। इसके अतिरिक्त, टीएलसी द्वारा रूमेक्स ऐसिटोसेला मूल अपमिश्रण की रासायनिक मिलावट को वर्गिकीय तौर पर निकटतम संबंधित रूमेक्स क्रिस्पस मूल अपमिश्रण से तुलना किया गया था। **परिणामः** परिण ामों ने विलयन विपरीतता सत्त और उसकी सत्त क्षमता के बीच मजबूत संबंध दर्शाया है। एक सरल टीएलसी अध्ययन समान जाति की दो दवाओं, रूमेक्स, के बीच मजबूत सहसंबंध को दर्शाता है, मगर इनके अनूठे निशानों से इनमें भेद किया जा सकता है। **निष्कर्षः** हमारा अध्ययन ना केवल रूमेक्स एसेटोसेला नामक दवा के भौतिकरासायनिक मानकों को प्रदान करता है बल्कि यह भी दर्शाता है कि एक सरल मूल्यांकन तकनीक, एक हस्तचालित टीएलसी का इस्तेमाल दो वर्गिकीय तौर पर निकटतम होम्योपैथिक दवाओं के बीच भेद करने के लिए आसानी से किया जा सकता है।

Standardisation physico-chimique du médicament homéopathique Rumex acetosella et sa comparaison avec un autre médicament homéopathique, *Rumex crispus*

Contexte: Le Rumex acetosella, un médicament relativement nouveau dans le système homéopathique, est traditionnellement utilisé pour traiter l'inflammation, le diabète et les problèmes gastro-intestinaux, en particulier la diarrhée. **Objectif:** Le but de ce travail est de rapporter dans un premier temps la normalisation physico-chimique du médicament homéopathique Rumex acetosella. De plus, nous évaluons notre méthode simple et économique pour la différencier d'une espèce étroitement apparentée, *Rumex crispus*. **Matériels et méthodes:** L'étude physico-chimique mesurant plusieurs paramètres a été réalisée. Le pH de la teinture mère et de l'extrait aqueux ont été mesurés et comparés. De plus, la composition chimique de la teinture mère de Rumex acetosella a été comparée par TLC à de la teinture mère de *Rumex crispus* étroitement apparentée sur le plan taxonomique. **Résultats:** Les résultats montrent une forte relation entre la polarité du solvant d'extraction et son pouvoir d'extraction. Une simple étude TLC montre une forte corrélation entre deux médicaments du même genre, Rumex, mais ils peuvent être différenciés par leurs taches uniques. **Conclusion:** Notre étude fournit non seulement les standards physico-chimiques pour le médicament Rumex acetosella mais montre également qu'une technique analytique simple, une TLC manuelle peut facilement être utilisée pour distinguer deux médicaments homéopathiques taxonomiquement proches.

Estandarización fisicoquímica de la droga homoeopática *Rumex acetosella* y su comparación con otra droga homoeopática, *Rumex crispus*

Antecedentes: Rumex acetosella, un fármaco relativamente nuevo en el sistema homeopático, se utiliza tradicionalmente para tratar la inflamación, la diabetes y los problemas gastrointestinales, especialmente la diarrea. **Objetivo:** El objetivo de este trabajo es informar primero sobre la clasificación fisicoquímica del fármaco homoeopático Rumex acetosella. Además, medimos a través de nuestro método simple y económico para diferenciarlo con una especie estrechamente relacionada, Además, calibramos nuestro método simple y económico para diferenciarlo con una especie estrechamente relacionada, *Rumex crispus.* **Materiales y métodos:** Se realizó el estudio fisicoquímico que mide varios parámetros. Se midió y comparó el pH de la tintura madre y el extracto de agua. Además, la composición química de la tintura madre de Rumex acetosella se comparó con la tintura madre de Rumex crispus estrechamente relacionada taxonómicamente por TLC. **Resultados:** Los resultados muestran una fuerte relación entre la polaridad del disolvente de extracción y su potencia de extracción. Un estudio sencillo de TLC muestra una fuerte correlación entre dos fármacos del mismo género, Rumex, pero pueden diferenciarse por sus manchas únicas. **Conclusión:** Nuestro estudio no sólo proporciona los estándares fisicoquímicos para el fármaco Rumex acetosella, sino que también muestra que una técnica analítica simple, un TLC manual puede ser fácilmente utilizado para distinguir dos fármacos homeopáticos taxonómicamente cercanos.

Physikochemische Standardisierung des homöopathischen Arzneimittels Rumex acetosella und dessen Vergleich mit einem anderen homöopathischen Arzneimittel, *Rumex crispus*

Hintergrund: Rumex acetosella, ein relativ neues Medikament im homöopathischen System, wird traditionell zur Behandlung von Entzündungen, Diabetes und Magen-Darm-Problemen, insbesondere Durchfallerkrankungen, eingesetzt. **Ziel:** Ziel dieser Arbeit ist es, zunächst über die physikalisch-chemische Standaridisierung des homöopathischen Arzneimittels Rumex acetosella zu berichten. Darüber hinaus messen wir unsere einfache und wirtschaftliche Methode, um sie mit einer eng verwandten Art, Rumex Crispus, zu unterscheiden. **Materialien und Methoden:** Die physikochemische Studie mit mehreren Parametern wurde durchgeführt. Der pH-Wert der Urtinktur und des Wasserextrakts wurden gemessen und verglichen. AußerdemDes Weiteren wurde die chemische Zusammensetzung der Rumex acetosella Urtinktur mit der taxonomisch eng verwandten Rumex crispus Urtinktur durch TLC verglichen. **Ergebnisse:** Die Ergebnisse zeigen eine starke Beziehung zwischen der Extraktion die Polarität des Lösungsmittels und seine Extraktionskraft. Eine einfache TLC-Studie zeigt eine starke Korrelation zwischen zwei Arzn eimitteln derselben Gattung, Rumex, aber sie können durch ihre einzigartigen Flecken unterschieden werden. **Schlussfolgerung Fazit:** Unsere Studie liefert nicht nur die physikochemischen Standards für das Medikament Rumex acetosella, sondern zeigt auch, dass eine einfache Analysetechnik, ein manuelles TLC, leicht verwendet werden kann, um zwei taxonomisch nahe stehende homöopathische Arzneimittel zu unterscheiden.

同种顺势疗法药物醋甲酸模酯的理化标准及其与同种顺势疗法药物鲁米克斯的比较

背景：回正疗法中相对较新的治疗药物 — 乙酰牛乳香，传统上用于治疗炎症、糖尿病、胃肠道疾病，尤其是腹泻类疾病。目标：本工作的目的是首次报道顺势疗法药物醋栗的物理化学标准化。此外，我们还考察了我们的简单而经济的方法用一种密切相关的物种 — 鲁梅克斯香草来区分它。材料和方法：通过理化试验，对试验中几个参数进行了测定。测定并比较了母酊和水提取液的pH值。此外，还用TLC对乙酰牛乳香母酊的化学成分与紫杉醇类密切相关的鲁梅克斯松母酊进行了对比。结果：结果表明，萃取溶剂极性与其萃取功率有很强的关系。TLC研究表明同一属的两种Rumex药物之间存在强烈的关联，但它们的独特点可以区分。结论：本研究不仅为乙酰牛乳糖酸模(醋栗)提供了理化标准，而且表明一种简单的分析技术，即手工TLC可以方便地用于区分两种类群关系接近的顺势疗药。