



UNIVERSITY OF THE PUNJAB

Third Prof. A/2015

Examination: Doctor of Pharmacy (Pharm.D.)

Roll No.

Subject: Pharmacognosy-II

TIME ALLOWED: 3 hrs.

PAPER: 3

MAX. MARKS: 100

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q 1. What are tannins . Discuss nut galls in detail. 20
- Q 2. Define oleoresins. Give the detail of Capsicum & Ginger. 20
- Q 3. Define Alkaloids and discuss purine alkaloids. 20
- Q 4. Write notes on
- i) Clove ii) Terpentine oil 20
- Q 5. Name Anthroquinone. Explain Senna in detail. 20
- Q 6. A) Classify chromatography on the basis of stationary and mobile phases. 10
- B) Discuss various techniques used for TLC. 10
- Q 7. Give botanical origin, family, part use, constituents and therapeutic uses of following crude drugs, 5x4
- I) Spermaceti
- II) Glycyrrhiza
- III) Hemmamelis
- IV) Coriander

UNIVERSITY OF THE PUNJAB



Third Prof. A/2016
Examination: Doctor of Pharmacy (Pharm.D.)

Roll No.

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

Subject: Pharmacognosy-II
PAPER: 3

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- | | |
|--|-----|
| Q 1. a) Define tannins. Give chemical classification of tannins. | 10 |
| b) Write note on Nut galls | 10 |
| Q 2. What are alkaloids? Discuss in detail tropane alkaloids. | 20 |
| Q 3. Write note on saponin glycosides. | 20 |
| Q 4. a) Differentiate between fixed oils and Volatile oils. | 10 |
| b) Write note on almond oil | 10 |
| Q 5. Discuss in detail partition chromatography | 20 |
| Q 6. Give structure and therapeutic uses of following drugs, | 5x4 |
| 1. Ergotamine | |
| 2. Physostigmine | |
| 3. Digitoxin | |
| 4. Ephadrine | |
| Q 7. a) Define resins. Discuss their occurrence and uses. | 10 |
| b) Write note on Cinnamon and Caraway. | 10 |



UNIVERSITY OF THE PUNJAB

Third Prof. 2nd A/2016

Examination: Doctor of Pharmacy (Pharm.D.)

Roll No.

Subject: Pharmacognosy-II

PAPER: 3

TIME ALLOWED: 3 hrs.

MAX. MARKS: 100

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q. 1 a) Define tannins. Discuss uses of tannins. 10
b) Write Pharmacognostic note on hamamelis. 10
- Q 2. What are alkaloids? Discuss Quinoline Alkaloids 20
- Q 3. Write note on the following
a. Bees Wax
b. Lanoline 20
- Q 4. Define chromatography; discuss in detail Paper Chromatography. 20
- Q 5. Give structure and therapeutic uses of following drugs, 4x5
1. Caffeine
2. Quinidine
3. Aloe emodin
4. Eucalyptol
- Q 6. Write notes on Phenolic volatile oils. 20
- Q 7. Describe the detail of following crude drugs. 4x5
i) White squill
ii) Cochineal
iii) Vanilla
iv) Ginger



UNIVERSITY OF THE PUNJAB

Third Prof: Annual - 2017
Examination: Doctor of Pharmacy (Pharm.D.)

Roll No.

Subject: Pharmacognosy-II (Old Course)
Pharmacognosy-II (Advance) (New Course)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

PAPER: 3

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q-No.1. (A) What are glycosides and discuss crude drugs containing anthraquinone glycosides. 20
- Q-No.2. Define volatile oils? Discuss in detail about the chemistry of volatile oil? 20
- Q-No.3. What are alkaloids, how they can be classified.. Discuss crude drugs containing alkaloidal amines. 20
- Q-No.4. (A) Define tannins and give chemical classification of tannins? 10+10
(B) Discuss shortly
i) Asafoetida
ii) Hammamelis
- Q-No.5. Describe partition chromatography, explain paper chromatography. 20
- Q-No.6. Give the botanical origin, family, constituents and uses of following crude drugs. 20
i. Rosin iii. White squill
ii. Honey iv. Cinchona
- Q-No.7. Give the structural formulae of the followings. 20
i. Atropine iii. Physostigmine
ii. Codeine iv. Hyoscyamine



UNIVERSITY OF THE PUNJAB

Third Prof: 2nd Annual - 2017
Examination: Doctor of Pharmacy (Pharm.D.)

Roll No.

Subject: Pharmacognosy-II (Old Course)
Pharmacognosy-II (Advance) (New Course)

Common

TIME ALLOWED: 3 hrs.
MAX. MARKS: 100

PAPER: 3

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q-No.1. Differentiate between volatile oils and fixed oils. Discuss the crude drugs containing phenolic volatile oils. 20
- Q-No.2. (A) What are alkaloids. Discuss the extraction method of alkaloids.
(B) Write a note on Ergot. 12+08
- Q-No.3. (A) Differentiate between tannins and pseudo tannins. Discuss the chemical and biological properties of tannins
(B) Describe Lanoline. 14+06
- Q-No.4. (A) Discuss the chemistry, pharmacological actions and uses of digitalis.
(B) Write Pharmacognostic note on cannabis. 14+06
- Q-No.5. Define adsorption Chromatography, Explain thin layer chromatography. 20
- Q-No.6. Give the botanical origin, family, constituents and uses of following 20
- | | |
|-----------------|----------------|
| i. Nux-vomica | iii. Cochineal |
| ii. Ipecacuanha | iv. Podophylum |
- Q-No.7. Give the structural formulae of the followings. 20
- | | |
|--------------|---------------|
| i. Isoprene | iii. Vanillin |
| ii. Nicotine | iv. Ephadrine |



UNIVERSITY OF THE PUNJAB

Third Prof: Annual – 2018
Examination: Doctor of Pharmacy (Pharm.D.)

Roll No.

Subject: Pharmacognosy-II (Advanced) (New Course)
PAPER: 3 (Part – II)

TIME ALLOWED: 2 Hrs. & 30 min.
MAX. MARKS: 80

Attempt this Paper on Separate Answer Sheet provided.
Attempt any 4 questions. Each question carry equal marks.

Q: No: 2-(a) Define Neutraceuticals and Cosmeceuticals?

06

(b) Briefly discuss Neutraceuticals?

14

Q: No: 3-Write a note on

- a. Clove
- b. Allium,
- c. Sweetorange peel
- d. Camphor

(5x4=20)

Q: No: 4-What are alkaloids .Discuss in detail Ergot.

20

Q: No: 5-Draw the structures of the following

(5x4=20)

- a.Colchicine
- b.Ephedrine
- c.Brucine
- d.Cardanolide

Q: No: 6- (a)Define Chromatography. Explain Adsorption and Partition chromatography. 10

(b)Give the different Resin combinations?

10

Q: No: 7- Discuss Starch and Honey

20



UNIVERSITY OF THE PUNJAB

Third Prof: Annual – 2018

Examination: Doctor of Pharmacy (Pharm.D.)

Roll No.

Subject: Pharmacognosy-II (Advanced) (New Course)

TIME ALLOWED: 30 min.

PAPER: 3 Part – I (Compulsory)

MAX. MARKS: 20

Attempt this Paper on this Question Sheet only.

Please encircle the correct statement. Each MCQ carries 1 Marks. This Paper will be collected back after expiry of time limit mentioned above.

1. Wagner's reagent is used to detect the presence of
 - a. Steroids
 - b. Alkaloids
 - c. Glycosides
 - d. Terpenes
2. Camphor belongs to.
 - a. Phenol volatile oil
 - b. Phenolic ether volatile oil
 - c. Aldehyde volatile oil
 - d. Ketone volatile oil
3. Which of the following is not a vegetable oil.
 - a. Peanut oil
 - b. Almond oil
 - c. Sesame oil
 - d. Petrolatum
4. Commercial source of Tannic acid is.
 - a. Catechu
 - b. Hamamelis
 - c. Kino
 - d. Nut galls
5. Which one of the following plants belongs to family Zingiberaceae
 - a. Carum
 - b. Colchicum
 - c. Curcuma
 - d. Capsicum
6. Peppermint contain alcohol volatile oils while spearmint contain,
 - a. Alcohol volatile oils
 - b. Ketone volatile oils
 - c. Phenol volatile oils
 - d. Aldehyde volatile oil
7. Fluorescence shown by gambir fluorescein is
 - a. Yellow
 - b. Green
 - c. Blue
 - d. Red
8. Biological source of camphor is
 - a. Camphora molmol
 - b. Camphora sinensis
 - c. Camphora officinale
 - d. Camphora canadensis
9. Molecular weight of pseudo tannins is less than
 - a. 500
 - b. 1000
 - c. 1500
 - d. 2000

10. Gold's beater's skin test is negative for
- Gallic acid
 - Ellagic acid
 - Tannic acid
 - All of above
11. Molecular formula for isoprene unit is
- C_8H_8
 - C_6H_8
 - C_3H_8
 - C_5H_8
12. Steam distillation is used for the extraction of
- Fixed oil
 - Volatile oils
 - Glycoside
 - Tannins
13. Capsicum contains
- Glycoresin
 - Oleoresin
 - Gum resin
 - Oleogum resin
14. Flower bud of which drug having medicinal importance
- Cardamom
 - Fennel
 - Clove
 - Caraway
15. The chief active constituent of fennel:
- Carvone
 - Borneol
 - Dill-Apiole
 - Fenchone
16. Keller-Kilani test is used to identify
- Saponin glycosides
 - Cardic glycosides
 - Lactone glycosides
 - Aldehyde glycosides
17. Following alkaloids are solid except
- Caffeine
 - Reserpine
 - Nicotine
 - Colchicine
18. An alkaloid of opium having smooth muscle relaxant effect is
- (a) Morphine (b) papaverine (c) codeine (d) narcotine
19. Glycyrrhiza is used as
- Expectorant
 - Stomach ulcer
 - Sweetening agent
 - All of above
20. Crude turpentine is obtained by
- Expression
 - Cup and Gutter method
 - Steam distillation
 - Destructive distillation



UNIVERSITY OF THE PUNJAB

Third Prof: 2nd Annual – 2018

Examination: Doctor of Pharmacy (Pharm.D.)

Roll No. in Fig.

Roll No. in Words.

Subject: Pharmacognosy-II (Advanced) (New Course)

PAPER: 3 Part – I (Compulsory)

MAX. TIME: 30 Min.

MAX. MARKS: 20

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer cutting and overwriting is not allowed. (20x1=20)

1. Alkaloids are naturally occurring compounds which containin their molecules.
 - a. One or more N atoms
 - b. Two heterocyclic rings
 - c. A side-chain on one of the benzene rings
 - d. One or more N atoms originating from amino acids
2. Crude drug rich in mucilage is
 - a. Peppermint
 - b. Digitalis
 - c. Strophanthus
 - d. Ispaghul
3. Proto alkaloids are also called as
 - a. Extra alkaloids
 - b. Pseudo alkaloids
 - c. True alkaloids
 - d. Amino alkaloids
4. Therapeutic activity of glycosides are due to.
 - a. Glycone
 - b. Aglycone
 - c. Sugar
 - d. Whole molecule
5. Commonly used Stationary phase in TLC is
 - a. Silicon powder
 - b. Silica Gel
 - c. Alum
 - d. Cellulose
6. Inulin is an...
 - a. Arabin
 - b. Pectin
 - c. Galactane
 - d. Mannan
7. Which of the following is an alkaloid with a purine skeleton?
 - a. Hygrine
 - b. Theobromine
 - c. Ephedrine
 - d. Strychnine
8. Steroidal skeleton are present in
 - a. Vanilla
 - b. Cantharides
 - c. Cochineal
 - d. Digitalis
9. Most of volatile oils are rich in
 - a. Sulfur containing compounds
 - b. Fluorinated hydrocarbons
 - c. Purines and pyrimidines
 - d. terpenes and sesquiterpines

P.T.O.

10. Coriander contains volatile oil belonging to chemical class
- Alcohol
 - Phenol
 - Ketone
 - Aldehyde
11. Gradient elution is the sub type of
- Elution development
 - Frontal development
 - Displacement development
 - Simple development
12. Cinchona alkaloids contains
- Quinine
 - Emetine
 - Cephaline
 - Psychotrine
13. Oleoresin is the
- Resin+volatile oil
 - Resin+Fixed oil
 - Resin+gums
 - Resnates
14. Sanguinaria is used as
- Antihypertensive
 - Emetic
 - Antiemetic
 - Analgesic
15. Mucilages are
- Pathological products
 - Physiological product
 - Biological products
 - Secretion
16. Fresh leaves of digitalis after collection should be dried
- Immediately at a temperature below 60°C
 - Immediately at a temperature below 0°C (freeze drying)
 - Immediately above 100°C for quick evaporation of water.
 - Under shade
17. *Nux-vomica* belongs to the family
- Leguminosae
 - Loganiaceae
 - Solanaceae
 - Liliaceae
18. Antiarrhythmic effect of cinchona is due to
- Quinine
 - Cinchonine
 - Quinidine
 - Cinchonidine
19. Caramel is also known as
- Burnt sugar
 - Brown sugar
 - Sweet sugar
 - Chocolate sugar
20. Heroin is
- (a) 3,6 diacetyl morphine (b) brown sugar (c) addictive (d) all of the above



UNIVERSITY OF THE PUNJAB

Doctor of Pharmacy (Pharm.D.) Third Prof: Annual-2019

Subject: Pharmacognosy-II (Advanced) (New Course)

Paper: 3 Part - I (Compulsory)

Time: 30 Min. Marks: 20

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the correct option.

(20x1=20)

- i. The principal cinchona alkaloid employed therapeutically as anti-protozoal drug
 - a) quinine
 - b) chloroquine
 - c) quinarcline
 - d) quinidine
- ii. The solid resin from turpentine:
 - a) benzoin
 - b) styrax
 - c) tolu
 - d) rosin
- iii. Which benzoin is used in perfumery industry
 - a) Siam benzoin
 - b) Styrax tonkinensis
 - c) Siam
 - d) All of the above
- iv. All drugs belong to alkaloids, except:
 - a) Ergot
 - b) Belladonna
 - c) Ephedra
 - d) Clove
- v. All of the following are the medicinal use of Myrrh except
 - a) Anti-malarial
 - b) Stimulant tonic
 - c) Anti-oxidant
 - d) Anti-narcotic
- vi. Group of compound called curcuminoids are found in:
 - a) Garlic
 - b) Ginger
 - c) Turmeric
 - d) Clove
- vii. Which of the following physico-chemical characteristics is correct for mucilages?
 - a) foaming
 - b) specific color
 - c) specific gravity
 - d) viscosity
- viii. Diterpenes contain number of isoprene _____ units
 - a) Two
 - b) Four
 - c) Five
 - d) Twenty
- ix. The odour of Hing is
 - a) Vanilla-like
 - b) Garlic-like
 - c) Alliaceous
 - d) Both b & c
- x. The volatile oils are complex mixtures of _____
 - a) Mono and diterpene alcohols and ethers
 - b) Sesquiterpenes and other aromatic compounds
 - c) Mono and Sesquiterpenes and phenylpropanoid derivatives
 - d) All of the above.
- xi. Which of the following plant are mitotic inhibitors?
 - a) Colchicine
 - b) Podophylotoxin
 - c) Vincristine
 - d) All of the above

P.T.O.

- xii. Hasis (hashish) consists _____ of *Cannabis sativa*
 a) gum of the male flowers
 b) resin of the female flowers
 c) gum of the male and female flowers
 d) pressed juice of the leaves
 e) latex of the tops
- xiii. Gambirfluorescin test is used for drug
 a) Arjuna
 b) Ashoka
 c) Pale catechu
 d) Black catechu
- xiv. The water soluble portion of tragacanth is known as
 a) Tragacanthin
 b) Bassorin
 c) Galctouronic acid
 d) D-galctopyranose
- xv. Which species of cinchona contains highest percentage alkaloid?
 a) Cinchona succirubra
 b) Cinchona officinalis
 c) Cinchona calisaya
 d) Cinchona ledgeriana
- xvi. The characteristic aroma of clove is due to
 a) Vanilline
 b) Eugenol acetate
 c) Eugenol
 d) Crategolic acid
- xvii. The garlicky smell of garlic is due to the presence of:
 a) Allin
 b) Allicin
 c) Ajoene
 d) Allyl methyl sulphide
- xviii. The anthraquinone glycosides can be detected by:
 a) Keller killiani test
 b) Wagner test
 c) Borntrager test
 d) All of the above
- xix. Hydrolysable tannins such as gallic acids are united by _____ linkages to a central glucose molecule:
 a) Ether
 b) Ester
 c) Oxygen
 d) None of the above
- xx. Aglycone of saponin glycoside is of _____ types
 a) 1
 b) 2
 c) 3
 d) 4



UNIVERSITY OF THE PUNJAB

Doctor of Pharmacy (Pharm.D.) Third Prof: Annual-2019

Roll No.

Subject: Pharmacognosy-II (Advanced) (New Course)

Paper: 3 Part – II

Time: 2 Hrs. 30 Min. Marks: 80

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Note: Attempt any *FOUR* questions. Each question carries equal marks.

- Q.2. Define chromatography and explain in detail about Thin Layer chromatography. (20)
- Q.3. Discuss the general methods of extraction of alkaloids. Write a short note on following alkaloid containing crude drugs. (a) Vinca (b) Nux-vomica. (20)
- Q.4. Differentiate between pseudo tannins and true tannins? Discuss in detail uses of tannins? Write a note on catechu. (20)
- Q.5. Discuss crude drugs used in cardiac diseases. (20)
- Q.6. What are volatile oils? Write Pharmacognostic notes on phenolic volatile oils. (20)
- Q.7.a) Define resins. What are different classes of Resins. (10)
- b) Discuss different crude drugs used in the treatment of diabetes. (10)



UNIVERSITY OF THE PUNJAB

Doctor of Pharmacy (Pharm.D.) Third Prof: Annual-2019

Roll No.

Subject: Pharmacognosy-II (Old Course)

Paper: 3

Time: 3 Hrs. Marks: 100

Note: Attempt any *FIVE* questions. Each question carries equal marks.

- Q-1** Define chromatography and explain in detail about Thin Layer chromatography. 20
- Q-2** Discuss the following alkaloid containing crude drugs. 20
(a) Tea (b) Rauwolfia (c) Vinca (d) Nux-vomica.
- Q-3** What are carbohydrates? How they can be lassified. Explain gum acacia. 20
- Q-4** Define glycosides? Write Pharmacognostic note on cardioactive glycosides? 20
- Q-5** Define volatile oils? Give the methods of extraction for volatile oils? 20
- Q-6** Define resins and different resin combinations? Write note on Cannabis. 20
- Q-7** Write note on any two of the followings 20
- a) Camphor
 - b) Scopolamine
 - c) Vanillin
 - d) Olive oil



UNIVERSITY OF THE PUNJAB
Doctor of Pharmacy (Pharm.D.) Third Prof: Annual-2021

Roll No.

Subject: Pharmacognosy-II (Advanced) (New Course)
Paper: 3 Part – II

Time: 2 Hrs. 30 Min. Marks: 80

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Note: Attempt any *FOUR* questions. Each question carries equal marks.

- Q:2 Write down chemical classification of Glycosides. Discuss in details drugs containing Saponin Glycosides. 20
- Q:3 a) Define and classify chromatography. 05
b) Differentiate between gums and mucilages. Write a detailed note on Acacia. 15
- Q:4 a) Describe the formation, phytochemistry and uses of Nutgalls. 10
b) Define Resins. Discuss the chemistry of resins. 10
- Q:5 a) Discuss various methods for obtaining volatile oils. 10
b) Discuss the clinical Pharmacognosy of drugs used for respiratory disorders. 10
- Q:6 a) Describe various chemical tests for identification of Alkaloids. 10
b) Explain Opium alkaloids with their chemical structures. 10
- Q:7 Write note on any TWO of followings 10 each
a) Cosmeceuticals
b) Taxol as tumor inhibitor
c) Cannabis



UNIVERSITY OF THE PUNJAB

Doctor of Pharmacy (Pharm.D.) Third Prof: Annual-2021

Subject: Pharmacognosy-II (Advanced) (New Course)

Paper: 3 Part - I (Compulsory)

Time: 30 Min. Marks: 20

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the correct option.

(20x1=20)

1. Which of the following is used in cardiac arrhythmias
 - a. Morphine
 - b. Quinine
 - c. Quinidine
 - d. Atropine
2. Hydrastine is used as _____ in inflammation of mucus membranes.
 - a. Emollient
 - b. Astringent
 - c. Antiseptic
 - d. Antipyretic
3. Folklore reputation of catharanthus plant was
 - a. Anticancer agent
 - b. Hypoglycemic agent
 - c. Hypolipidemic agent
 - d. Antiulcerative agent
4. HPLC columns are made up of
 - a. Pyrex glass
 - b. Stainless steel
 - c. Silver
 - d. Gold plated
5. Sample volume required for NMR experiment is
 - a. 0.2 ml
 - b. 0.1ml
 - c. 0.5ml
 - d. 0.05ml
6. The difference between absorption position of the proton and absorption position of the proton of the reference compound is known as
 - a. Shielding
 - b. Deshielding
 - c. Diamagnetic Shielding
 - d. Chemical Shift
7. ¹³C NMR spectrum provides us the information about
 - a. Spin Spin coupling of the carbon atom
 - b. Partition Coefficient
 - c. Diamagnetic Shielding
 - d. Chemical Shift
8. Resins and its combinations can be either _____ product.
 - a. physiological product
 - b. pathological product
 - c. annual products
 - d. both physiological or pathological products
9. Aqueous extract of cannabis is used in Canasol drops, which is used for
 - a. Rehnitus
 - b. Polionosis
 - c. Glaucoma
 - d. Typhoid
10. Which method volatile oil obtained from those plant parts which are very small and volatile oils are decomposed on distillation process.
 - a. Enfleurage
 - b. Expression Method
 - c. Enzymatic Hydrolysis
 - d. Solvent Extraction
11. Citrus fruits belong to which class of volatile oils
 - a. Alcoholic volatile oils
 - b. Aldehydic volatile oils
 - c. Phenolic volatile oils
 - d. Ketonic volatile oils
12. Silymarin is naturally occurring hepatoprotective agent obtained from -----
 - a. *Silybum marianum*
 - b. *Artemisia annua*
 - c. *Echinaceae purpurea*
 - d. *Arctium lappa*
13. Jojoba oil is an example of
 - a. Fixed oil
 - b. Fat
 - c. Wax
 - d. Oleo resin

14. Short wave length UV light used to detect compounds
- 230 nm
 - 254 nm
 - 195 nm
 - 255 nm
15. Sweet taste of Glycyrrhiza is due to
- Glucose
 - Glycyrrhizin
 - Liquiritin
 - Glycyramarin
16. Which alkaloid is used as Alcohol denaturant
- Strychnine
 - Ergometrine
 - Eserine
 - Dimethoxy Strychnine
17. Scillabiose of Scillarin consists of
- Rhamnose & Cymarose
 - Rhamnose & Scillarenin
 - Glucose & Cymarose
 - Rhamnose & Glucose
18. Which alkaloid is used as antidote for organophosphate poisoning
- Atropine
 - Nicotine
 - Pilocarpine
 - Tubocurarine
19. Colchicum contains following alkaloid
- Alkaloidal amine
 - Pseudoalkaloids
 - True alkaloids
 - None of these
20. Biological source of Cacao butter is
- Erythroxylum coca*
 - Theobroma cacao*
 - Both (a) and (b)
 - Cinnamomum zeylanicum*