



EFFECT OF PETROLEUM ETHER EXTRACT OF DIFFERENT PLANT PARTS ON SEEDLING EMERGENCE OF CHICK PEA AND PIGEON PEA BY POT CULTIVATION METHOD.

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ABSTRACT

Chickpea (*Cicer arietinum* L.) and Pigeon pea (*Cajanus cajan* L.) are important dietary pulses; rich in protein and minerals. Pathogenic fungi affect adversely to yield and grain quality of these pulses. Seventeen and fourteen fungi are found to affect adversely to seed germination and seedling emergence of Chickpea and Pigeon pea. Biological control of seed-borne fungi as well as boosting of seedling growth by some plant extract is tried in present work. Assertive results are obtained in case of few plant extracts.

KEYWORDS: plant extracts, pulses, root length, shoot length.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is small much branched plant attaining height of about 2 feet. The leaves are pinnately compound the Papilionaceous flowers are solitary and the pods contains one or two seeds. It is cultivated in dry cool climate during Rabi season in the regions with low to moderate rainfall. It is cultivated as intercrop along with Jowar, Wheat and Bajra etc during October-November. The crop is harvested after about 3-4 months in February – March. It is mainly cultivated in Uttar Pradesh, Punjab, Rajasthan, Madhya Pradesh, Bihar, Maharashtra, Andhra Pradesh, West Bengal, Tamil Nadu and Karnataka.

The malic and oxalic acids from the leaves of Chickpea are useful in intestinal disorders. It contains protein 20.5g/ 100g of seeds and carbohydrates 59.6 g/ 100g of seeds with thiamin (0.30mg), riboflavin (0.15mg), niacin (2.9mg), vitamin C (3mg) and phosphorous (312 mg) (Shakuntala Manay and M. Shadaksharaswamy, 1987).

Pigeon pea (*Cajanus cajan* L.) is an annual shrub of about 6-7 feet. The inflorescence is a typical axillary raceme bearing Papilionaceous flowers. It is cultivated as a mixed crop with Kharif cereals in low rainfall areas. Sowing is done in June – July and harvested after 6-8 months, between January- February. It is commonly cultivated in Uttar Pradesh, Orissa, Rajasthan, Maharashtra, Bihar and Tamil Nadu.

It contains protein 20.4 g/100 g of seeds and carbohydrates are 60.4 g/100 g of seeds suggesting that it

is also good source of protein and carbohydrates, it also contain thiamin (0.45mg), niacin (2-9mg) and riboflavin (0.19mg). It has better quality of fiber (7g/ 100g of seeds). (Shakuntala Manay and M. Shadaksharaswamy, 1987).

These pulse crops are affected by different fungal pathogens as seed mycoflora which is harmful to seed health and seed content and ultimately to yield. Association of the fungi with the seeds has found to be harmful to the seed health and seed content. Such seeds are found to be harmful both for agriculture and human consumption. Such infected seeds may carry many pathogens; as shown by studies in the case of leguminous crops (Saxena and Sinha, 1977; Saxena and Gupta, 1981; and Maheshwari *et al.* 1984).

Plants have different natural bio-chemicals that are used as medicines in India, China, Egypt and Greece in ancient times (Patwardhan and Hopper, 1991). It is feasible to harness plants to cure and enhance plant health; hence in present work, attempts were made to control pathogenic activity of common and dominant seed-borne fungi of test pulses with the help of some selected eighteen plants; *Acorus calamus* L., *Adenantha pavonia* L., *Azadirachta indica* A. Juss., *Butea monosperma* (Lam.) Taub., *Carum copticum* Benth & Hook. f., *Ciba pentandra*, *Croton tiglium* L., *Cyperus rotundus* L., *Eucalyptus globulus* Labill., *Melingtonia hortensis*, *Muntingia calabura* L., *Murraya koinigii* (L.) Spreng., *Ocimum basilicum* L., *Ocimum americanum* L., *Ocimum sanctum* L., *Ruelia tuberosa* L.,

Samania saman (Jacq.) Merr., *Tagetis erecta* L. were tried for their antimycotic and plant growth activity.

MATERIALS AND METHODS

i) Preparation of petroleum ether plant extracts

Five gram powder of each of the plant parts dissolved separately in mixture of 50 ml petroleum ether and 50 ml distilled water; in 250 ml borosil glass conical flasks. The flasks were kept in oven (Metlab) for 24 hours at 60°C and the content filtered through Whatman filter paper No.1. The filtrates used as 5% plant extracts.

ii) Evaluation of seed mycoflora and seed health (seedling emergence, shoot and root length) of pulses

The seeds of Chickpea and Pigeon pea were soaked separately in the leaf, stem and root petroleum ether extracts (petroleum ether and water 1:1) of the selected plants for 24 hours. These treated seed sown in earthen pots containing sterile soil. On eleventh day seedlings uprooted washed, and their root, and shoot length recorded.

Source plant	50% petroleum ether + 5gm powder of	Chickpea (<i>Cicer arietinum</i> L.)			Pigeon pea (<i>Cajanus cajan</i> L.)		
		Seedling emergence (%)	RL (cm)	SL (cm)	Seedling emergence (%)	RL (cm)	SL (cm)
<i>Acorus calamus</i> L.	Leaf	60	12	13	80	10.2	11
	Rhizome	50	14	14.2	60	12.3	12.5
<i>Adenanthera pavonia</i> L.	Leaf	50	13.1	14	55	12.3	13
	Stem	70	12.5	13	67	13.3	14
	Root	40	15.5	14.3	70	15	15
<i>Azadirachta indica</i> A. Juss.	Leaf	100	15	15.2	100	16	16.3
	Stem	80	14	13.3	90	13.4	14
	Root	82	13.3	15	78	12	10
<i>Butea monosperma</i> (Lam.) Taub.	Leaf	60	12	13.2	90	09	11
	Stem	50	10.3	11.3	70	08	10
	Root	80	11.2	10.3	60	12	12.5
<i>Carum copticum</i> Benth & Hook. f.	Leaf	60	12.2	13	50	11	12.4
	Stem	80	13	12.2	40	13.4	14.3
	Root	50	12.5	14	70	15	14.3
<i>Ciba pentandra</i>	Leaf	50	12.2	12.4	80	16	15.2
	Stem	70	11.1	10.2	50	15.4	14
	Root	80	15.2	14.3	70	11.3	13
<i>Croton tiglium</i> L.	Leaf	60	12.2	13	55	12.2	10
	Stem	50	13	13.4	60	10	11
	Root	80	12.2	13	40	08	10
<i>Cyperus rotundus</i> L.	Leaf	85	15.1	16	90	15.5	15
	Rhizome	90	16	16.5	100	16.3	17
<i>Eucalyptus globules</i> . Labill.	Leaf	60	15.4	15.6	90	14.2	12.5
	Stem	60	15.8	14.5	50	12.3	13.2
	Root	80	12.1	13	50	14.5	14.8
<i>Melingtonia hortensis</i>	Leaf	50	12	10	60	15	16
	Stem	50	13	13.5	40	10	10.3
	Root	60	09	10	50	08	11
<i>Muntangia calabura</i> L.	Leaf	70	08	06	15	07	07
	Stem	60	08	08	40	12	12.3
	Root	70	10	12	40	11	12.3
<i>Murraya koinigii</i> (L.) Spreng.	Leaf	60	07	10	90	14	15
	Stem	30	5.6	05	30	12	10
	Root	70	7.6	08	80	13	13
<i>Ocimum basilicum</i> L.	Leaf	100	18	16.5	100	11.4	11
	Stem	90	15.4	15	80	10.8	09
	Root	90	12	11.3	77	12.2	13
<i>Ocimum americanum</i> L.	Leaf	100	16	16.2	98	15.5	12.3
	Stem	80	15.2	15	80	14.8	15
	Root	90	14.5	15	72	13.8	15
<i>Ocimum sanctum</i> L.	Leaf	100	16.4	15	100	15.4	14
	Stem	80	15	15.3	80	16.3	15.3
	Root	80	15.4	14.8	67	17	15.6

<i>Ruelia tuberosa</i> L.	Leaf	60	12.2	13	50	12	13
	Stem	80	15	15.2	90	12.4	13
	Root	50	12.3	14	70	10	11
<i>Samania saman</i> (Jacq.) Merr.	Leaf	50	09	11	60	11	10
	Stem	60	08	08	80	10.4	11
	Root	70	06	10	55	12.2	12
<i>Tagetis erecta</i> L.	Leaf	80	11	12	60	09	11
	Stem	60	11.3	13	40	05	09
	Root	50	12.2	12	50	12	10
Control	Sterile distilled water	50	13	14	57	12.5	11.3

RESULT AND DISCUSSION

It is evident from the tabulated result that, all the plant parts extract were found to be supportive or stimulatory for seedling emergence, shoot and root length of the test pulse in more or less degree, with minor exceptions.

In case of Green gram stimulatory effect on seedling emergence by some plants like *Ocimum basilicum* L., *Ocimum americanum* L. (leaf 100%) followed by *Ocimum sanctum* L. and *Azadirachta indica* A. Juss (leaf 100% each). Minimum seedling emergence was shown by *Murraya koinigii* (L.) Spreng. (stem 30%) and *Adenantha pavonia* L. (root 40%), rest of the plants were with more or less supportive effect on seedling emergence. Root length was much better in *Ocimum basilicum* L. (leaf 18 cm) compared to control, followed by *Ocimum sanctum* L. (leaf 16.4 cm). Root length reduction over control was noticed in *Murraya koinigii* (L.) Spreng. (stem 5.6 cm) followed by *Samania saman* (Jacq.) Merr. Shoot length was better in *Ocimum basilicum* L. (16.5 cm) compared to control and other plant extracts.

In case of Black gram, Maximum seedling emergence was reported due to the plant extracts like *Azadirachta indica* A. Juss (leaf 100%), *Cyperus rotundus* L. (rhizome 100%), *Ocimum basilicum* L. (leaf 100%) and *Ocimum sanctum* L. (leaf 100%). These plant extracts showed stimulatory activity on the test pulse for seedling emergence. Majority of plant extracts were having stimulatory effects on root length, *Ocimum sanctum* L. (stem extract) and *Cyperus rotundus* L. rhizome extract 16.3 cm each, *Ocimum americanum* L. leaf extract 15.5 cm, *Ocimum sanctum* L. leaf extract and *Ciba pentandra* stem extract 15.4 cm each etc.

Most of the plant extracts showed stimulatory effects on root and shoot length owing to their phytochemicals. Maximum stimulatory effect was seen in *Cyperus rotundus* L. (rhizome 17 cm), *Azadirachta indica* A. Juss (leaf 16.3 cm), *Ocimum sanctum* L. (root 15.6 cm and stem 15.3 cm) etc. on the contrary few extracts were having inhibitory effect on shoot length.

Similar results were reported by Meena, (2001) with aqueous extracts of *Cyperus rotundus* L. at 2.5%, 5 %, 7.5% and 10% were found to be stimulatory to seed germination, seedling emergence of Pigeon pea and Urd

bean. Sagar *et al.* (2002) studied effects of *Azadirachta indica* A. Juss, *Ocimum sanctum* L. (*Ocimum tenuiflorum*), *Parthenium hysterophorus*, *Prosopis julifera* and *Bougainvillea* used as seed treatments and found that, there was overall reduction in the percentage of mycoflora and significant increase in seed germination and seedling vigor. Thippeswamy *et al.* (2003) studied plant extracts of ten plants on fungi of oil seed crops, most plant extracts inhibited fungal incidence and showed stimulatory activity on germination and seedling emergence. Rathor and Kagne (2005) studied extracts of plants of *Ocimum sanctum* L., *Mentha viridis*, *Abutilon indicum*, *Ipomoea carnea* and found it to be inhibitory to seed mycoflora where as *Ocimum sanctum* L. was found to be stimulatory to seed germination, root and shoot length of Bajra. Dong *et.al.* (2012) found stimulatory effect of *Triticum aestivum* L. on seed germination of *Orbanche minor* sm. Dhole *et.al.* (2011) reported allelopathic effects of five weed species viz. *Ameranthus tricolor* L., *Euphorbia heterophylla* L., *Physalis angulata* L., *Alternanthera sessilis* L. and *Portulaca oleracea* L. The aqueous extract of *Portulaca oleracea* L. was found to be stimulatory effect towards seed germination root length, shoot length and seedling growth of Jowar. *Physalis angulata* L. had shown inhibitory effect while *Ameranthus tricolor* L., *Alternanthera sessilis* L., *Euphorbia heterophylla* L. having moderate inhibitory effect.

The study indicate that some plant extracts could be harnessed as seed protectant as well as seedling growth supporter. Phytochemicals, from selected plants, like azdirachtin, nimbidin, nibonin, quircitin, eugenol, linalool, methyl chavicol important in the ensuing effects in the present study.

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