



## PERENNIAL CHILLIES GERMPLASM IDENTIFIED AND EXPLORED FROM BIHAR

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**ABSTRACT:** Quality seeds are the indispensable material for successful crop production. Germplasm resource contains unique traits/genes that can be utilized for further crop improvement. Exploration for collection of germplasm is the quickest and simplest method for acquiring the desired one. Perennial type of chillies has been identified and explored from WALMI Research farm of ICAR Research Complex for Eastern Region Patna (Bihar). This unique germplasm has been entered in the seventh successive years of successful fruiting. Such distinctive genotype could be a great value for kitchen garden purpose, particularly in the era of nucleus family. Such promising and unique germplasm can be utilized by chillies worker in their respective on going/ensuing crop improvement programme to reinforcement food and nutritional security of country by efficient utilization.

**Keywords:** Exploration, germplasm, chillies, perennial, vegetable.

Chillies (*Capsicum annum* L.), belongs to the Hungarian world of plants confined in the family Solanaceae, belongs to the genus *Capsicum* with chromosome number of 24 (Ashokkumar *et al.*, 4; and Brian *et al.*, 8). Chillies peppers have been a part of the human diet in the Americas since at least 7500 BC. Chillies peppers originated in South and Central America, where they were used by the native inhabitants for thousands of years. There is archaeological evidence at sites located in south-western Ecuador that chillies peppers were domesticated more than 6000 years ago (BBC, 5). A chilli is one of the first cultivated crops in the Central and South Americas (Bosland, 6) that is self-pollinating. From South and Central America, it travelled to Europe after Columbus's voyage to Mexico in 1492 and later on spread to all over world (McClung, 12 and Pickersgill, 14). It is rich source of vitamin A and C (ascorbic acid). Vitamin C was first isolated from chillies plant. It is one of the most valuable commercial annual spice crop grown in India. Presently, India is the largest producer of chilli in the world owing to the availability of improved varieties (Dash *et al.*, 9). In India chilli is grown over an area of 7.67 lakh hectares with the production of 12.03 lakh tonnes and productivity of 1568 kg dry chilli per hectare,

(Anonymous, 2). Presently huge number of chillies varieties available varying in their pungency right from mild sweet peppers, to the viciously hot. Hotness of the chilli is measured in Scoville units. A relatively mild pepper, such as the Jalapeno commonly found in Salsas, measures around 5000 Scoville units, depending on individual variety and growing conditions (Basland and Vostava, 7). The hottest peppers, like the Habanero and Serrano, measure between 80,000 and 300,000 Scoville units (Kosuge *et al.*, 11 and Temburne and Rao, 18). Chillies, in general behave like annual and for commercial cultivation, it is grown as annual crop in all over the world. Though, life cycle of chilli is basically governed by the climatic condition. If it is grown in temperate climate it is essentially annual in nature, whereas, if it is grown in tropical condition especially in most areas of north of the equator, plants may behave like perennial, though they are grown as annuals plants. Though some marked as annuals can be grown as perennials indoors or in greenhouses (Aguilar-Meléndez, 1; and Pickersgill, 13 and 15). Though perennial behaviour of chillies is reported by several workers but its economical sustainability was not much studied due very easy in propagation through seedling raising. This peculiarity was the main



Fig. 1. Full and closeup view of six year old chilli plant.

focal point to undertake study on its perennial behavioural study.

#### MATERIALS AND METHODS

An extraordinary plant type of chilli was identified at the research farm WALMI, of ICAR Research complex for Eastern Region Patna and this distinct plant type was marked for regular visit. The source of this unique germplasm was a farm staff, who procured local chillies sapling from local market for his kitchen garden purpose. Actually this plant was a second generation plant transplanted from the seedling raised from the crop already harvested from kitchen garden. Initially up to 3 years general ward and watch was maintained by the farm worker who used to pick chillies fruits for their consumption purpose during their lunch. In general chillies are cultivated as annual for commercial purpose, across the globe. However perennial nature is reported in this genus, though this phenomenon is limited to the tropics especially

places near to equator (Jovicich and Cantliffe, 10; and Aguilar-Meléndez, 1). Since, 2-3 fruiting seasons is often, but obviously, when this plant did not shown any symptoms regarding completion of its lifecycle, we started taking care in a cavalier fashion, up to 4 years. Since, 5<sup>th</sup> year onwards, regular training and pruning was taking place (Fig. 1 and Fig. 2a, 2b). Regular, watering and weeding was carried out, required dose of NPK and FYM was supplement to maintain uninterrupted supply of essential nutrient on regular basis. Urea was supplement at 25 days intervals, whereas P and K was supplemented at the interval of six month only. No major incidence of pests and diseases were noticed, though profilecting measure was taken well in advance to avoid any such incidence. Yearly soil sample were analysed to know the soil health status. Since the soil is sandy loam in texture, FYM has been added regularly. Training and pruning of the plant was done in a such way that at least one branch is always maintained at lower level near the ground and other non productive were kept out

(Ara *et al.*, 3). Plant is still active and bearing fruits on regular basis. Since 2009, when perennial nature was confirmed, data were recorded for growth, development yield attributes and chillies yield regularly and computed on yearly basis. It worth to mention here that data for first and second year was generated by raising crop from seed harvested from this plant and the plant was maintained for two years.

## RESULTS AND DISCUSSION

Visual observation was taken place for initial period of three years, and when it was come to the notice that this plant is behaving like perennial and completed successfully three years of fruiting on regular basis. It was observed that plant behave like indeterminate growth habit. It is worth to mentioned that this plant by and large its phenology does not influenced by the seasons, temperature and photoperiod. Seem to be photo-thermal insensitive plant. It is but obvious that performance of plant little bit slowdown during extreme cold and

hotter months of the years especially during scratchy wind during mid May to mid June.

Data recorded during all the six years (Table 1) reveals that plant height of this chilli plant increased with the advancement of the age. At the end of first year it attains the height of 38.6cm only. Plant achieved its height of 148.2 cm at the end of six year. Annual fruit production by the plant was increased with the age. Minimum (336 fruits) was recorded for first year and maximum (1117 fruits) for the sixth year production. Likewise green fruits yield was also followed the similar trend. At the end of first year green fruits yield was recorded 1077g only which increased with age and maximum 3607g was recorded at the end of sixth year. It was recorded that fruit length was not influenced by the age of plant, though it was categorized as medium size (Table 1). Similarly single fruit weight also did not influenced much with passing of time (age). Fruit length and single fruit weight did not influenced by the age, this might be due to traits is highly associated with genotype, not much influenced by the age or environment confirming to findings of Singh and Bhatt (17).



Fig. 2a. Chillies fruit.



Fig. 2b. Closeup of fruiting twig.

To know the changes in soil fertility status, soil samples were taken at regular interval starting from June, 2007 and latest by June, 2012. Soil samples were analysed to workout initial and final soil fertility status to know the nutrient dynamic in soil of the perennial chilli plant (Ryan *et al.*, 16). Data (Table 4), represent initial and final soil properties physical parameters viz., sand, silt and clay composition of soil was not much influenced by the chilli. Bulk density of soil also did not change. However, other parameter related to soil fertility gets influenced. N, P and K were improved significantly (Table 2). Since chilli is endowed with professed root system, encourage more rhizosphere microbial activities, substantial nutrient build-up was noticed. Above results indicate that chillies plants can be grown easily without impairing the fertility status of soils.



**Table 1: Growth, yield attributes and yields of yield of chillies plant during different years.**

Years	Plant height (cm)	Fruit length (cm)	Fruit (No/ plant)	Single fruit weight (g)	Green fruits yield (g/ plant)
Ist	38.6	7.53	336	3.21	1077
2nd	69.5	7.38	526	3.21	1689
3rd	91.2	7.56	774	3.11	2408
4th	115.3	7.43	921	3.16	2910
5th	129.6	7.31	1115	3.09	3445
6th	148.2	7.44	1117	3.23	3607
CD (P=0.05)	14.9	NS	57.4	NS	201.3



Fig. 3a. One year old chilli plant



Fig. 3b. Two year old chilli plant.

**Table 2: Physiochemical properties of chilli soil.**

Value	Sand (%)	Silt (%)	Clay (%)	Soil pH	Organic carbon (%)	Bulk Density (m m <sup>3</sup> )	Electrical Conductivity (dSm <sup>-1</sup> )	NO <sub>3</sub> (ppm)	Available Phosphorus (ppm)	Exchangeable Potassium (ppm)
Initial	33.1	36.4	30.5	7.4	0.61	1.42	0.17	113.7	12.1	87.8
Final	32.5	36.3	31.2	7.1	0.68	1.40	0.15	131.9	13.4	97.3

## CONCLUSION

Unique germplasm, exploration for collection of desired traits not only strengthen and diversify the gene pool of particular crop, but also proves a quickest as well as simplest method of achieving objective of creating variability. Exploration for

collection should be an integral part of any plant germplasm augmentation programme. Biennial nature is often but a perennial chilli is not a business as usual phenomenon. Successful fruiting for six years and entered in to seventh year is not a normal and simple event. This plant type is definitely carrying /containing some unique gene

and expressing their potential for regular fruiting. This genotype behaves like photo and thermal insensitive line. Such potential germplasm should be deposited in National Gene Bank for safe conservation and nationwide uses in crop improvement programme.

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