Multi cob-bearing popcorn (*Puakzo*) maize: a unique landrace of Mizoram, North East, India

Mizoram is a mountainous (*Lushai* hill range) state with closely spaced inter-mountain valleys, demographically dominated by indigenous tribes (*Mizo*) constituting 94.4% of the total population[1]. These tribal populations ensure the conservation of plant genetic resources for the future, for the food and nutritional security of an increasing population. Since 1976, in the northeastern hill region intensive collections of maize landraces were made by ICAR-NBPGR, New Delhi and diversity of landraces maize from this region comprised 36% of the total collection from whole India, which was the highest number of accession among other regions[2]. The maize landraces in this region were reported to show extensive variability for plant, tassel, ear and kernel characteristics, and are interesting from the viewpoints of breeding, diffusion and evolution of maize[3]. Mizoram is also considered a rich genetic resource hill state in the North East for the existing diverse groups of flora and fauna. Among numerous cereal crops, traditional maize (*Zea mays* L.) belonging to the family Poaceae, commonly called *Vaimin* by the local people in Mizoram, occupies maximum area next to rice, widely grown in homestead and *jhum* areas under rainfed conditions. In India, maize is used as food for human consumption; the seeds/cobs are eaten raw, poped, roasted or boiled. Other uses include livestock/poultry feed, raw material for corn starch, oil, etc.[4]. In Mizoram, local maize is broadly classified into three categories based on use and taste, viz. *Puakzo* (popcorn), *Mimban* (sticky/starchy/sweet) and *Mimpuii* (roasted/feed)[5,6]. During 2013, 70 distinct maize landrace germplasm were collected from all districts of Mizoram in collaboration with the Directorate of Agriculture, Government of Mizoram and 11 landraces were categorized under popcorn (*Puakzo*; *puak* = pop, *zo* = all) category. These landraces were evaluated for their various agro-morphological popping characteristics during *rabi* and *kharif* season 2013–14 at the Experimental Farm in ICAR, Mizoram Centre (Table 1). Popcorn is small flint maize that is widely consumed as a snack food worldwide; it was first discovered by native Americans[7]. Its popularity has been increasing over time throughout the world[8]. A unique landrace popcorn maize, MZM-31 (NBPGR, New Delhi, IC-611490) was collected from Haurang village (585 m altitude), Lunglei district, Mizoram, capable of bearing multiple cobs per plant in the range 4–5 (Figure

Table 1. Agro morphological and popping ability characteristics of landrace popcorn (*Puakzo*) maize of Mizoram, MZM-31 (IC-611490)

Characteristics	Description*
Plant height	219.76 cm
Days to 50% teaseling	93 days
Days to 50% silking	100 days
Days to maturity	126 days
Ear length (without husk)	10.54 cm
No. of cobs/plant	4–5
Ear diameter in the middle (without husk)	2.5 cm
No. of grains/cob	335.3
Grain size	0.47 cm
100 Kernel weight	11.1 g
Grain colour	Dark red
Ear shape	Cylindrical
Kernel row arrangement	Spiral
Popping percentage	> 90
Silk colour	Purple
Anther colour	Yellow
Adaptation/habitat	*Jhum*/homestead
Flake colour	White

*Mean of 10 plants and cobs.

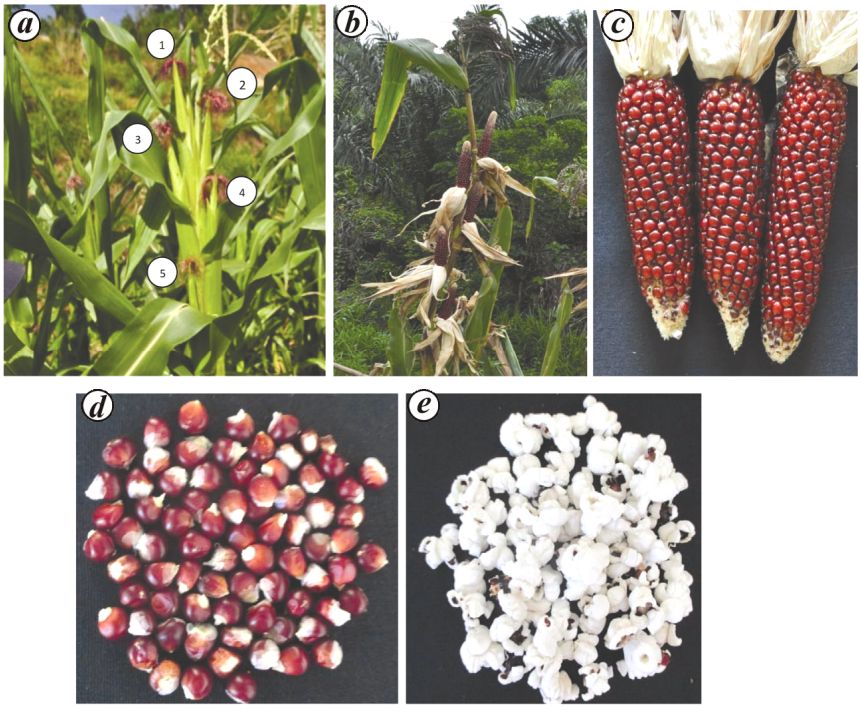

Figure 1. Mizoram popcorn (*Puakzo*) maize, MZM-31 (IC-611490). ***a***, Silking and tasseling stage; ***b***, Five red cobs at maturity stage; ***c***, Dehusked cobs; ***d***, Un-popped kernels; ***e***, White popcorn flakes.

1 *a* and *b*). The dark red kernel (Figure 1 *c*) indicates that it is rich in anthocyanin and possesses high popping ability (Figure 1 *d* and *e*). A maize genotype (MCM-11/01, IC-0524594) having multi (three cobs per plant) cob-bearing habit was also collected from Manipur by NBPGR RS, Shillong and registered under PGRC of ICAR (INGR-13054)[8]. The Northeastern hill states are rich in all types of maize, popcorn, flint corn and dent corn, sweet corn, sticky and waxy type[9]. Mostly, the popcorn collected from northeastern region was smaller in cob size, early to medium duration, various kernel colour and tall in height[3,7]. Popcorn is an economically important crop with possible multiplier effects like income generation for under-resourced communities, especially in developing countries like India[10–12]. It is an important snack food worldwide with significant nutritional benefits, including proteins, carbohydrates, fat, minerals (iron, phosphorus and calcium) and vitamins (B_1, B_2 and niacin)[13]. However, adequate cultivation and production of popcorn in the states of NE India is hampered by lack of adequate and adapted cultivars. Moreover, Sikkim landraces of maize have been studied and characterized at both phenotypic and molecular levels[14–17]. Therefore, the unique character of this landrace can be further exploited for maize improvement programmes with respect to cob-bearing habit, popping ability and nutritional quality.

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