



Outside, basking amongst natural grazing. Large shallow water trays allow easy access.

Forward: The following is based upon 7 years of keeping adults and a year in raising hatchlings. It is not meant to be a complete A-Z of the care requirements for these wonderful tortoises, merely pointers to get new keepers to think about the requirements and responsibility of taking on 1 or 2 of these tortoises. Further research is always advisable and as many sources of information consulted as possible. By learning more about these tortoises, then we can adapt and improve our management of them accordingly.

Background: Indian star tortoises come from 3 different areas on the Indian sub-continent, mostly found in hot and dry, semi-arid areas, but monsoons occur, so for some of the year they experience high humidity. **This species of tortoise does not hibernate.** Captive bred Stars are different from their wild caught family members being more sociable. It is important with any tortoise to be regularly weighed and examined, so by handling them often they do not become shy. On no account should Indian stars be mixed with any other species as they may harbour bacteria and pathogens that do not affect the host species but could be fatal to your Star.

The following authors quote these sizes: Tikader/Sharma: Females up to 250mm and males 160mm. **Highfield:** Females up to 290mm and males 230mm. **Das:** Vague, reports largest female 380mm weighing 7kg **Fife:** Females up to 250mm and males 150mm. **Lanka:** Females: 300mm and males 200mm Typically, adult females average around 2 kg and males from 400g up to 1.1kg depending greatly on where they come from. Tortoises from the 3 areas referred to, will readily interbreed, and so the majority of stars now bred in captivity are probably of mixed origin. Often we look at specific animals and they show certain traits associated with a particular locality, but unless the breeder knows exactly where they came from, then this is guesswork. Most stars that have come from India or Sri-Lanka have been smuggled, caught, collected and transported, mixed with others and then exported.



Female Plastron Male



Female Carapace Male

Housing Adults: As a tropical species, these tortoises need a warm environment all year round. Many owners keep them inside in heated enclosures throughout the year, providing both heat and light artificially. This species is perfect in the respect that they do not grow too large, and will not outgrow a well thought out and researched enclosure. Many keepers do not let their Stars outside, apart from the hottest days in the UK. *This is a shame.* My Stars have access to an outside enclosure from May to September (weather permitting). Close weather monitoring is essential for the early and late parts of this outdoor season. As my Stars are housed all year round in a purpose-built enclosure with an en-suite greenhouse, I can restrict them to their house, give them access to only the greenhouse, or allow free roaming from house through greenhouse and on to outside. ***My Stars always have freedom to access a heat source.***



Part of the outside runs



The en-suite greenhouse

Hatchlings: Hatchlings are more delicate than the adults and also require year round heat and light. Many hatchlings are kept successfully on tortoise-tables. Keeping tortoises in a vivarium is often frowned upon, as it is hard to provide a suitable heat gradient and enough air movement, which can lead to respiratory illness. However, a well thought out and designed vivarium is preferable, in my opinion, to an open tortoise-table in winter, even in a centrally heated house. Hatchlings need to be kept above 21-22°C at night and free from draughts. Tortoise-tables can be made to achieve this, but a little research is needed. A vivarium would need to be a large size and well thought out if it is to be able to offer a suitable heat gradient in the summer!. There are pros and cons to both; many sites and forum discuss this in detail. Alternatively, you could make a purpose-built home incorporating both, see example below. Re Hatchlings and the big outside. I would like to write from experience, but I can't. My first hatchlings arrived in June 2009, and we moved house in the July and November, so never had chance to put them out. My intention will be to put mine out on fine warm days only, and only when supervised. Follow standard precautions against theft and predators as well as protection *from too much sun.*

First Home ... bark only



Then change to give topsoil/bark mix



These photos are meant to give ideas which can be developed

Lighting & Heat: Both adults and hatchlings require the right kind of light and adequate heat. Tortoises require UVB light (not visible to humans) to be able to utilize the calcium in the diet and incorporate it into their skeleton. Calcium is also used in the nervous system. The system is complex, but in layman's terms UVB is absorbed, allowing the body to convert certain elements/chemicals into Vitamin D3 (see supplements) which is then used to enable the absorption of calcium. Failure to allow access to UVB, or by feeding foods containing oxalates (these bind to the calcium and prevent the body from absorbing it) will lead to a sick tortoise. UVB can be supplied using strip lights or the newer compact style tubes. All these will require replacing after about 6-9 months as the UVB they give off diminishes. To maximize output, always use a suitable reflector and do not place further away from the tortoise than 30cm (always follow the instructions from the manufacturer). Alternatively, most keepers use a combined heat and UVB lamp. As they fulfil two aspects, they are seen as a more superior way. Some of the modern bulbs have a greater amount of UVB available after 12 months than others. Take a look on the internet, research and price the alternatives. Make sure you follow the instructions for distance, as well as using suitable fittings, reflectors and cables. Always provide areas away from the heat and light sources allowing the tortoises to choose what suits them. Light should be on a 12 month cycle representing what would normally be seen in nature. Indian stars require daytime temps of 28-30°C, night temps of 20°C. Consideration must be given to allow a basking spot to allow both hatchlings and adults to raise their body temperatures to the mid 30'sC to allow correct body functioning. Care must be made in allowing the tortoises to thermoregulate their body temperature (move from hot to cooler areas and vice versa) as they see the need. Depending on the housing chosen and the lights used, additional heat will be required. If using an UVB strip light, then a basking light will be required as stated above. Additional and night time heat could be supplied via halogen light (day only), ceramic heaters, heat mats (attached to the sides or roof of an enclosure only) Infra-red bulbs, etc.

Whatever heat source is used, it is vital to check, and check again, the temperatures achieved. Make sure all electrical equipment is correctly installed, controlled by thermostat and guarded as required. Many fires have been started by hobbyists not following basic precautions. (I know of one couple who thought it was safe to use adhesive tape to fit a basking lamp to the roof of an enclosure!) Another point worth mentioning is the fact that nearly all bulbs and heaters used here in the UK by the hobbyist will only require the use of a 3 amp fuse, but often such equipment will come with the standard 13amp fuse fitted. Always check and fit the correct size, failure to do this could again lead to fire.

Substrates: The use of correct substrates in housing both adults and hatchlings is important. I prefer to use topsoil with both my adults and hatchlings. For the hatchlings it is approx 50mm deep. This allows them to partially bury themselves and become part of the "mass" of the substrate. This helps them maintain or reduce body temperatures. Topsoil also allows microclimates, ie. cooler areas, areas that are dry, areas that are warm and areas that are moister. They can choose the temperature and humidity they require. I prefer to keep the majority of the substrate dry with smaller areas with high humidity. Some people set up humidity hides which again allow the same process. *As always, give them a choice, and learn from them what they prefer.* **Avoid constant high humidity as it can lead to respiratory issues.** My adults are kept on topsoil as well, but with a far greater depth to allow nesting. Areas can be set up with 'readigrass' to allow a different alternative (some Stars enjoy hiding in this), be wary of mould growing on the grass, turning and aerating will help prevent this, as will placing a divide between the topsoil and grass.

Water: Always provide a shallow water bowl for hatchlings as they like to soak. I place mine towards the warm end of the enclosure as this allows the water to become warm for them to soak and defecate in, as well as slowly evaporating and raising the humidity in a dry centrally heated house. Adult stars love water and will soak and defecate readily. When kept inside, this could be a problem as they constantly walk through the water bowls, soaking the soil. In a small area this could raise the humidity. In the summer my water bowls are placed outside. In the winter some people restrict the water available. I have started to use something on the lines of a poultry water holder which allows them to drink, but not to walk through, the

water. Alternatively, you could place the water bowl on a flat plastic tray to minimise water spillage. My adults love being sprayed with warm water; some people believe it may help entice the males to seek to mate. My male seems to manage to mate without the need for spraying, but he still enjoys it. It is common to find my Stars outside, grazing, in the rain, during the summer months.

Feeding: Both hatchlings and adult Stars require a diet high in fibre, low in protein, high in calcium and low in phosphorus. The list below is by no means complete, but gives many of the widely used foods for Stars and other tortoises alike. As Stars mature they become more of a grazing species if given the chance. My adults, in summer, are content to graze predominantly on the grass in their outdoor enclosures. In the winter months I use a lot of a dried grass (readi-grass or Just-grass). They enjoy this re-hydrated with water and mixed with grated carrot and sliced opuntia. Of course you can mix any other suitable food into this as well. One of the reasons for the grated carrot is that it attracts the Stars to feed on this mixture and they then get used to eating the grass. Another reason is, that it is reported to have natural worming properties, and it is also high in vitamin A. It is worth noting that a healthy adult Star is capable of taking bites from whole carrots. Hatchlings will enjoy the above weed based diet but may require a mix salad leaf based diet in winter. Try and vary as much as possible while avoiding tomatoes and iceberg lettuce and cucumber. Fruit for Stars is a matter of debate; I believe that while some Stars in the wild may have the occasional opportunity to feed on some kinds of fruit, the majority will not. Therefore I do not recommend that it forms any set percentage of their diet. However, I see no reason why they cannot be given seedless fruits as an *occasional* treat. **Wild foods:** Dandelion, Nipplewort, Red Clover, White Clover, Hosta, Wild Rocket, Chickweed, Greater Plantain, Ribwort plantain, Sow Thistle's (smooth, prickly, perennial) Red Dead Nettle, White Dead Nettle, Hawk's Beard, Hawkweed, Cats Ear, Garlic mustard, Bindweeds, Trefoils, Vetch, Goose grass (sticky weed), Mallows, Lavatera, Honeysuckle, Shepherd's purse, Soft comfrey, Speedwell, Sorrel, Cranesbill, Toadflax, Chicory, Hawksbit, Bittercress, Heartsease (viola's), Campanula **Garden plants:** Hibiscus, Opuntia (prickly pear), Bramble leaves (young shoots), Mulberry leaves, Sedum, Rose petals & leaves.

Supplements: For both adults and hatchlings I supplement regularly with Nutrobal and calcium carbonate "limestone flour". As Nutrobal, and some other types of vitamin preparations for tortoises, contain Vitamin D3, their use must be restricted, otherwise it is possible to overdose the Vitamin D3 (please read note on UVB light). To overcome this, it is generally accepted to use the Nutrobal/vitamin powders every other or third day (while the calcium can be used daily). To make life easier, I mix my calcium and Nutrobal in a 3:1 ratio (example; 30g of calcium to 10g of nutrobal), this I can then use daily. I then lightly sprinkle this on the food. When adults are grazing outside, this is not possible, so, weekly, I will give them some form of preferred food dusted with this mix. Many people recommend the use of cuttlefish as a way of providing calcium and to keep their beaks in trim. I do not use or recommend cuttlefish, as while I accept it helps, I think it is far better to use lumps of natural chalk (I am lucky to live in an area rich in chalk). Babies and adults alike enjoy nibbling it and egg laying females actively graze on it. Chalk when dry is fairly hard, but it will absorb moisture, so can be put in water to increase the moisture content. It then becomes softer, making easier grazing for females after a calcium boost.