Let $H$ be a finite dimensional pointed rank one Hopf algebra of nilpotent type, and $G = G(H)$, the group of group-like elements of $H$. We study the finite dimensional indecomposable $H$-modules and establish the Clebsch-Gordan formulas for the decompositions of the tensor products of indecomposable $H$-modules. It turns out that the Green ring $r(H)$ is commutative and generated by one variable over the Grothendieck ring of the group algebra $kG$ modulo one relation. The Jacobson radical of $r(H)$ is completely determined and is a principal ideal of $r(H)$ generated by one element. As an example, we shall describe the Green ring of the pointed rank one Hopf algebra $H$ with $G(H)$ a Dihedral group.