Brassinosteroid (BR) and auxin co-regulate plant growth in a process termed cross-talking. Based on the assumption that their signal transductions are partially shared, inhibitory chemicals for both signal transductions were screened from a commercially-available library. A chemical designated as NJ15 diminished the growth promotion of both adzuki bean epicotyls and Arabidopsis seedlings, by either the application of BR or auxin. To understand its target site(s), bioassays with a high dependence on either the signal transduction of BR (BR-signaling) or of auxin (AX-signaling), were performed. NJ15 inhibited photomorphogenesis of Arabidopsis seedlings grown in the dark, which mainly depends on BR-signaling, while NJ15 also inhibited their gravitropic responses mainly depending on AX-signaling. On the study for the structure-activity relationships of NJ15 analogues, they showed strong correlations on the inhibitory profiles between BR- and AX-signalings. These correlations imply that NJ15 targets the downstream pathway after the integration of BR- and AX-signals.